

As regards the *Collocalia* left undetermined in my account of Mr. Brown's last collection (see P. Z. S. 1879, p. 447, sp. 12), Count Salvadori has kindly examined the specimen and favoured me with the subjoined remarks:—

“Through the kindness of Mr. Tristram I have been able to examine the specimen from the Solomon Islands, attributed by him to *C. linchi* (Ibis, 1879, p. 438); and I find that it belongs to the group containing *C. francisca* (Gm.), with the upper parts dark, almost black, and with the underparts uniformly grey. Therefore most probably it does not belong to *C. linchi*, Horsf., which appertains to the *Collocalia esculenta* group. It seems to me that the Solomon-Island specimen belongs to *C. fuciphaga* (Thunb.)<sup>1</sup>. I can only notice that it has the upper parts blacker, and the underparts of a lighter and purer grey than Javan, Bornean, Amboina, and Kei-Islands specimens of *C. fuciphaga*.

“A specimen from the Duke-of-York Island submitted to my examination by Mr. Sclater (*Collocalia* sp. inc., P. Z. S. 1879, p. 447), belongs to the same species as Mr. Tristram's specimen.”

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February 17, 1880.

Prof. W. H. Flower, F.R.S., President, in the Chair.

The Secretary made the following report on the additions to the Society's Menagerie during January 1880:—

The total number of registered additions to the Society's Menagerie during the month of January was 89, of which 57 were by presentation, 28 by purchase, 1 was received in exchange, and 3 on deposit. The total number of departures during the same period, by death and removals, was 84.

The most noticeable additions during the month were:—

1. A Japanese Hawk-Eagle (*Spizaetus orientalis*)<sup>2</sup>, from Japan, being the first individual of this scarce bird of prey we have received. It was presented to us by our Corresponding Member, Harry Pryer, Esq., of Yokohama, and arrived, under the kind care of Mr. Maries, on January 6.

2. Two Blue-eyed Cockatoos (*Cacatua ophthalmica*), presented by the Rev. George Brown, C.M.Z.S., of Duke-of-York Island. This acquisition is of much interest, as the species was hitherto believed to be peculiar to the Solomon Islands. Mr. Brown, who transmitted these birds to Mr. Ramsay's care in Sydney in September 1877, along with a pair of the *Ecclectus* (which unfortunately died at Sydney), tells me that this Cockatoo is found in New Britain, but not in New Ireland.

I take this opportunity of exhibiting a drawing by Mr. Smit (Plate

<sup>1</sup> “I cannot agree with Lord Walden, who (Ibis, 1874, p. 135) considers *C. linchi*, Horsf., to be the same as *C. fuciphaga*, Thunb.”

<sup>2</sup> Temm. et Schl. Fauna Japonica, Aves, p. 7, pl. iii. Mr. Sharpe (Cat. B. i. p. 267) identifies this species with *S. nipalensis* of India; but I am not quite sure that this identification is correct.

IX.) of a Parrot of the genus *Chrysotis*, now living in the Society's Gardens, which appears to belong to an undescribed species. It was purchased of one of the London dealers in February 1879, and was originally considered an immature example of *Chrysotis dufresniana*, to which species it is most nearly allied. But it has remained without material change since its arrival, and a closer examination leads me to believe that it is not an immature bird. I therefore propose to describe it as follows:—

CHRYSOTIS CÆLIGENA. (Plate IX.)

*Clare viridis, fronte flavida, facie tota utrinque cyaneo lavata; speculo alari aurantiaco; caudæ apice flavicante; crassitie paulo minore quam in C. dufresniana.*

In Vivario Soc. Zool. Lond.

*Obs.* Similis *C. dufresnianæ*, sed genis cæruleis, fronte non rubrâ, speculo alari flavo et caudâ nullo modo rubrâ distinguenda.

The bird described by Dr. Finsch (Papag. ii. p. 532) as the young of *C. dufresniana* is probably this species.

Singularly enough I have just received (this morning, Feb. 17th) a box of skins for examination from Mr. G. N. Lawrence of New York, amongst which is a single example of this Parrot, obtained "on the Essequibo river in the winter of 1875-76, by Mr. A. H. Alexander, of West Hoboken, New Jersey." Mr. Lawrence gives to it the name "*cæligena*" in his paper (to be published in 'The Ibis'), which I adopt with pleasure instead of the name I had intended to propose for it.

Mr. Sclater called attention to the fact that *Colobus palliatus*, Peters, Monatsb. Ak. Berlin, 1868, p. 637 (recently figured, Monatsb. 1879, p. 830, tab. iv. A), of which he exhibited a specimen, seemed to be identical with *Colobus angolensis*, Sclater, P. Z. S. 1860, p. 246. Mr. Sclater had compared the type of his *C. angolensis*, a flat skin now in the British Museum, with a fine adult specimen from the Pangani river-valley on the Zanzibar coast, in the same collection lately received from Dr. Kirk, which was doubtless *Colobus palliatus* of Peters, and had found them to agree in nearly every respect, except that the Zanzibar example showed rather more white on the throat. The skin of *Colobus angolensis*, which was brought by Mr. Monteiro from Angola, might have travelled a long way from the interior of the continent; but it was certainly singular to find it identical with a species of the eastern coast.

The Secretary read the following extract from a letter addressed to him by Mr. W. B. Pryer, dated Elopura, Bay of Sandakan, Borneo, 27th October, 1879:—

"I nearly always have some half dozen different birds and animals about the house, and should be glad to send them to Singapore, on account of the Society, if you have any one there to receive and forward them. Amongst the specimens Monkeys take a leading place; but I presume these are not particularly required; the two species of



J Smit. aeth

Hanhart imp

1 CHRYSOTIS CÆLIGENA  
 2            "            DUFRESNIANA





Gibbons (*Hylobates*) might be interesting, and also, if it could be managed, a Proboscis-Monkey (*Semnopithecus nasalis*). Adults of this, however, invariably die within a few hours after capture; and young ones, though tame enough, are too delicate, as, with every care, they rarely survive for a week. Young bears also seem delicate, and a change of diet from sugar and milk to boiled rice killed my last in a day. Tungalungas (a sort of Civet), Gymnuras, Argus Pheasants, Nicobar Pigeons, Brush-Turkeys (*Megapodius*), and Hawks are among the specimens brought in; and I have had several Pittas as well. Snakes, Tortoises, Crocodiles up to 16 or 17 feet in length, and Monitors may always be had; and Orang Utangs (young) would come if I offered a reward for them. The full-grown Orang it is, of course, impossible to catch. I could send any of these things free to Singapore if you had any one there to receive and forward them on account of the Society. I have a young Sooloo Deer, a very pretty spotted animal, given me by the Sultan of Sooloo; but I hardly feel inclined to part with it. The ordinary large Banian Red Deer also sometimes comes to me; the last time I was at sea we gave chase to one in the steamer, and caught it and hauled it on board alive!

“You may be interested to hear that I am sending home this mail a skull and skin of head of a two-horned Rhinoceros. The second horn is certainly not very big, but I did not know before that there was a two-horned species of Rhinoceros in Borneo.”

Prof. Flower exhibited the skull in question, which had been kindly lent to the Meeting for examination by Mr. Alfred Dent, and made the following remarks:—

“In some notes on the cranial and dental characters of *Rhinoceros* (P. Z. S. 1876, p. 450), I identified the skull of a young animal, obtained in Borneo by Mr. Lowe, of Labuan, and added in the previous year to the British-Museum collection, with *R. sumatrensis*.

“The present additional evidence of the existence of a Rhinoceros in Northern Borneo consists of a skull and the skin of the face, with both horns, of an aged individual. The molar teeth are worn down almost to their roots, yet the two lower incisors are retained. This is noted because these teeth are absent in the specimen from Malacca, which formerly lived in the Society’s Gardens, and in another in the Brussels Museum (*cf.* Garrod, P. Z. S. 1873, p. 92). The præmaxillæ are also united with the maxillæ, though the line of suture is distinctly visible. In size and all essential structural characters the skull agrees with that of the female from Sumatra in the Museum of the Royal College of Surgeons, No. 2933, except that it is slightly smaller: and the teeth are also relatively smaller; but their extremely worn condition interferes with minute comparison. It differs greatly from the specimen from Tipperah, described in P. Z. S. 1878, p. 634, which was especially characterized by the breadth of the frontal region and the large size of the teeth. I should consider the present specimen to be quite a typical example of *Rhinoceros* sive *Ceratorhinus sumatrensis*. The only further point of interest to note is that the mesethmoid cartilage is ossified to a greater extent

than in any other specimen I have examined, so much so that portions of its irregular edge can be seen in a side view of the cranium projecting into the deep notch formed between the nasals and the maxillæ. This gives a semi-tichorhine appearance to the skull, but is probably only a consequence of age.

“The hair which remains upon the skin of the upper part of the face is perfectly black.

“The horns are extremely small, which indicates the probability of the animal having been of the female sex. They also appear to have undergone degeneration from age and wear, as it is extremely probable that in old or debilitated animals the formative process of the corneous material becomes impaired, and does not keep pace with the terminal decay and abrasion. The base of the anterior horn measures 4 inches from before backwards and  $2\frac{3}{4}$  transversely. Its upper surface has a rugged honeycombed appearance, except in the middle, from which a more solid process, of a subconical and slightly recurved form, projects, but which only attains an elevation of  $2\frac{1}{4}$  inches above the surface of the skin. The posterior horn is an extremely irregular, flattened, nearly circular nodule, averaging  $1\frac{3}{4}$  inch in diameter and scarcely 1 inch in elevation.”

The following papers were read:—

1. On the Bush-Dog (*Icticyon venaticus*, Lund).

By WILLIAM HENRY FLOWER, LL.D., F.R.S., P.Z.S.

[Received February 3, 1880.]

(Plate X.)

The death, on the 12th of December last, of the Bush-Dog from British Guiana, which was presented to the Society by Mr. Ernest Tinne on the 20th of August, 1879, has enabled me to place on record some notes on the anatomy of this somewhat aberrant member of the canine family, the viscera of which have not hitherto been examined.

The first notice we have of this animal is by Lund, who described it under the name of *Cynogale venatica*<sup>1</sup>. Afterwards a more full description with osteological details and figures of the animal and skull were given by the same author; and the generic name first imposed, having been already used by Gray for one of the Viverridæ, was changed to *Icticyon*<sup>2</sup>. An extinct species from the Brazilian caves, *Icticyon major*, was also doubtfully referred to the same genus.

In the ‘Annals and Magazine of Natural History,’ vol. xvii. p. 293 (1846), Dr. Gray, unaware of Lund’s memoir, described a specimen

<sup>1</sup> P. W. Lund, “Blik paa Brasiliens Dyreverden för sidste Jordomvæltning. 4<sup>de</sup> Afhandling,” Kong. Danske Videnskab. Selskabs, nat. og math. Afhandlinger, ix. Deel (Kjöbenhavn, 1842), p. 201.

<sup>2</sup> *Ibid.* 5<sup>te</sup> Afhandling, XI. Deel (1845), p. 62, Taf. xli. & xliii.



Harhart 1899

ICTICYON VENATICUS

J. Smit lith.





received at the British Museum from the Brazils under the name of *Cynalicus melanogaster*. It may here be noticed that the reference by the same author<sup>1</sup> of *Canis brachyotus*, of which the skull and teeth are figured by Blainville ('Ostéographie,' gen. *Canis*, pls. viii. & xii.) to this species, is incorrect; but Van der Hoeven has given a good figure of the same parts<sup>2</sup>. Very recently Cope has described (without figure) an extinct species from Oregon, which he refers to this group, under the name of *Icticyon crassivultus*<sup>3</sup>.

In consequence of the dental formula, and some superficial resemblance in external form, this animal has often been placed by systematists among the Mustelidæ; but its true position as a dog has been recognized by all who have closely investigated its structure. The living specimen much recalled in appearance a young Fox, and had the manners of a playful puppy. It was a female, and at the time of death nearly adult. All the permanent teeth were in place; but the canines were not fully protruded, and the epiphyses were not united to the ends of the long bones.

The only decided character by which it has been separated generically from *Canis*, besides the shortness and broadness of the skull, is the reduction in development of the true molar teeth. In the upper jaw the posterior molar of *Canis* ( $\frac{m.2}{}$ ) is stated to be absent, and  $\frac{m.1}{}$  is smaller and simpler than in the Dogs generally. In the lower jaw, whereas *Canis* has usually three true molars, *Icticyon* has but two; and the last which is developed is considerably smaller than its homologue in the ordinary forms. This appears to have been the case in all the specimens hitherto examined; but the present example presents an interesting variation, as, in addition to the teeth usually described as being present, it has a pair of very small tubercular molars above, the crowns of which are divided into an outer and an inner cusp. The dental formula, therefore, is  $i. \frac{3}{3}, c. \frac{1}{1}, pm. \frac{4}{4}, m. \frac{2}{2} = \frac{10}{10} = 40$ , corresponding with that of *Canis primævus* of Bengal, constituting the genus *Cuon* of Hodgson, to which animal *Icticyon* comes nearer, in the general form of the skull, than to any other of the group. The presence of these small teeth may be an individual peculiarity; or it may be that they are normally developed in the young animal, and are early deciduous, so that in the older specimens previously examined they have escaped notice. In any case they show a most interesting transitional character, and point to the fact that, in the reduction of the molar teeth, *Icticyon* is modified from a more generalized canine type. Another slight peculiarity in the dentition is that the inner tubercle of the upper sectorial is placed rather further from the anterior edge of the tooth than in *Canis*.

<sup>1</sup> 'Catalogue of Carnivorous, Pachydermatous, and Edentate Mammalia in the British Museum,' by J. E. Gray, 1869, p. 183.

<sup>2</sup> J. Van der Hoeven, "Over het geslacht *Icticyon*," Verhandelingen der Koninklijke Akademie van Wetenschappen, Derde Deel (Amsterdam, 1856).

<sup>3</sup> E. Cope, "On the Genera of Felidæ and Canidæ," Proc. Acad. Nat. Sciences Philadelphia, July 8th, 1879.



The length of the animal, from the tip of the nose to the end of the tail, was  $25\frac{1}{2}$  inches, of which the head measured  $5\frac{1}{2}$  inches, the neck and trunk  $15\frac{1}{2}$ , and the tail  $4\frac{1}{2}$  inches.

There are four pairs of mammæ, situated nearly equidistant on the ventral surface: the anterior pair over the ribs, nearly 2 inches behind the elbows; the second pair on the abdomen, slightly in front of the umbilicus; the third pair opposite the knee-joint; the last pair 2 inches in front of the vulva.

The relative length of the toes and form of the palmar and plantar pads can be best understood by a reference to the accompanying figures (figs. 1 and 2).

Fig. 1.

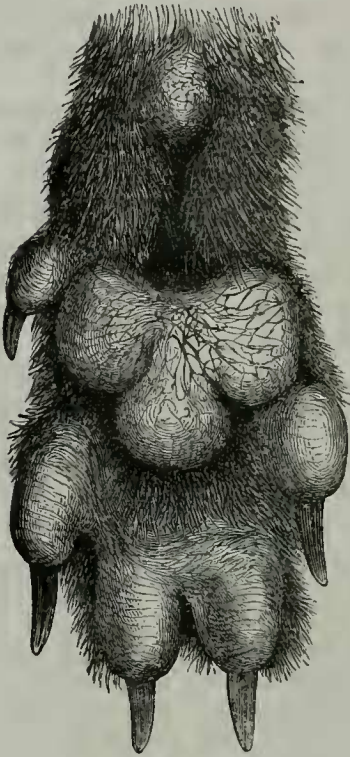


Fig. 2.

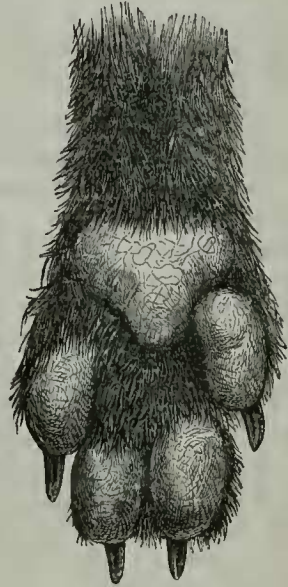


Fig. 1. Under surface of right fore foot of *Icticyon*; natural size.

Fig. 2. Under surface of right hind foot of *Icticyon*; natural size.

The tongue has a well-developed *lytta* and four small circumvalate papillæ on each side.

The stomach, as in the Dog, consists of a subglobular cardiac portion and a narrower pyloric portion, separated by a constriction. The small intestine measured 46 inches in length, and the large 10 inches. The only difference which the alimentary canal presents from the usual canine type is in the cæcum (fig. 3), which is very small,

only one inch and a half in length, slightly curved, and with a conical apex. This adds another to the list, given in the notice of the cæcum of the Red Wolf<sup>1</sup>, of Canidæ with small simple cæca. The liver (figs. 4 and 5) only differs from that of a small Terrier Dog<sup>2</sup> in a slight variation in the relative size of the lobes, perhaps not greater than would be met with in comparing this organ in a series of individuals of the same species.

The anal glands are large, oval, thin-walled sacs, with a muscular covering and smooth lining membrane, each .9 inch in length and

Fig. 3.



Cæcum of *Icticyon*; natural size.

.7 inch wide, and opening by a single orifice, large enough to admit a bristle, at the lateral margin of the anal aperture.

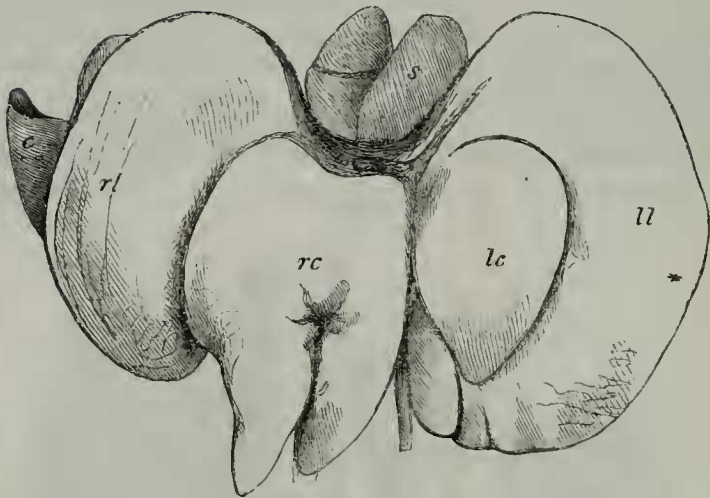
The brain (figs. 6 and 7, p. 75) is characteristically canine, except that, on the left side, the gyrus immediately surrounding the Sylvian fissure (fig. 6 *i'*, *i'*) is not marked off by a complete sulcus at its upper curved part from the one above it, and therefore almost reproduces the condition met with in the Felidæ, from which form, according to the view of the late Professor Garrod, the canine brain has been derived by complete division of the lower or external gyrus into an outer and inner segment<sup>3</sup>. Although I have no doubt, after examining a larger number of specimens than were available when attempting a classification and comparison of the cerebral convolutions of the

<sup>1</sup> See P. Z. S. 1879, p. 766.

<sup>2</sup> See "Lectures on the Comparative Anatomy of the Organs of Digestion in the Mammalia," 'Medical Times and Gazette,' June 1, 1872, p. 622, fig. 23.

<sup>3</sup> "Notes on the Visceral Anatomy of *Lycæon pictus* and of *Nyctereutes procyonides*," P. Z. S. 1878, p. 377.

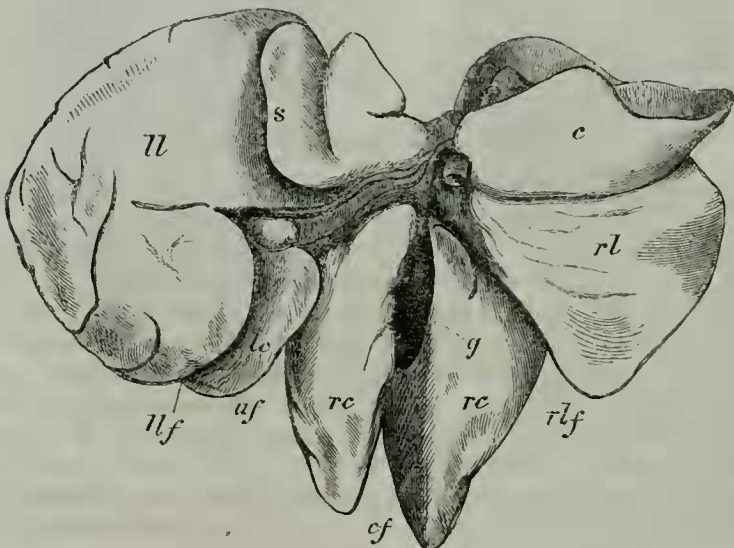
Fig. 4.



Upper surface of liver of *Icticyon*; half natural size.

*rl.* right lateral lobe; *rc.* right central lobe; *lc.* left central lobe; *ll.* left lateral lobe; *s.* Spigelian lobe; *c.* caudate lobe.

Fig. 5.

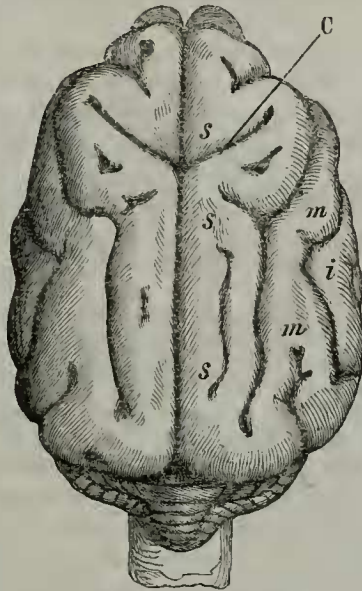


Under surface of liver of *Icticyon*; half natural size.

*uf.* umbilical fissure; *cf.* cystic fissure; *llf.* left lateral fissure; *rlf.* right lateral fissure; *ll.* left lateral lobe; *lc.* left central lobe; *rc.* right central lobe; *rl.* right lateral lobe; *s.* Spigelian lobe; *c.* caudate lobe; *g.* gall-bladder.

different groups of the Carnivora<sup>1</sup>, that the fourth (counting from the middle line) or inferior gyrus of the Dog is represented by the outer or inferior portion of the third (counting in the same way) of the

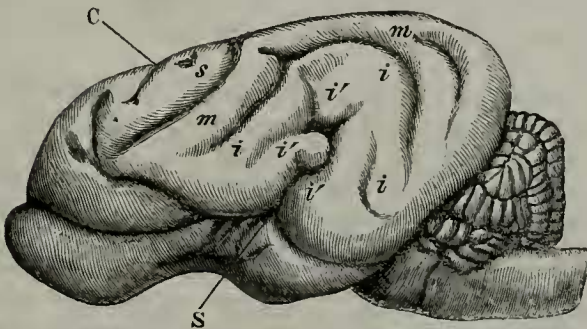
Fig. 6.



Upper surface of brain of *Icticyon*; natural size.

c. crucial sulcus; s, m, and i. superior, middle, and inferior lateral gyri.

Fig. 7.



Side view of brain of *Icticyon*; natural size.

S. Sylvian fissure; c. crucial sulcus; s. superior lateral gyrus; m. middle lateral gyrus; i. inferior lateral gyrus; i'. imperfect second inferior lateral gyrus, usually complete in the Canidæ.

other Carnivora, and is in many *Æluroids* already partially marked off by an interrupted sulcus, I am not prepared on that account to accept the conclusion that the Dog is a further modification of the

<sup>1</sup> See P. Z. S. 1869, p. 482.



highly specialized æluroid type. Very little else in the structure or the palæontological history of the Dog indicates that it has passed through a feline stage in its development; and its more complex brain may have been evolved quite independently from a primitive form. A comparative study of the development of the convolutions of the brain in the Dog and other Carnivora would throw light upon this subject.

2. On some Points in the Structure of *Nasiterna* bearing on its Affinities. By W. A. FORBES, B.A., F.L.S., Scholar of St. John's College, Cambridge, Prosector to the Society.

[Received February 12, 1880.]

For many years the true position in the series of Parrots of this very singular little form, of which about seven species are now known, has been a moot point amongst ornithologists, most authors placing it amongst the *Cacatuinæ*.

Although two accounts have been published of some points in the anatomy of *Nasiterna pusio*—first by Mr. Sclater when describing that species<sup>1</sup>, and secondly by Signor Camerano, in a paper read before the Turin Academy of Sciences<sup>2</sup>,—nothing very definite has resulted from them tending to elucidate this doubtful point. Mr. Sclater was inclined to regard it (*l. c.* p. 622) as “an aberrant form of the *Psittacinæ* . . . unless it can be allowed to stand as the type of a distinct subfamily, which would probably be more correct.”

At my request, some fifteen months ago, M. Alphonse Milne-Edwards was kind enough to forward to the late Prof. Garrod a specimen (in spirit) of a *Nasiterna*, probably *N. pygmæa*, for dissection; and I now place before the Society a few statements on its structure as recorded in his MS. notes.

As in all other Parrots, except in certain species of *Cacatua* and in *Licmetis tenuirostris*, there are two carotid arteries in *Nasiterna* (a fact previously recorded by Camerano), both of which run in the normal manner in the hypapophysial canal. As in all Parrots with the carotids so disposed (except some individuals of *Stringops*), the ambiens muscle is absent. The furcula is represented only by a rudiment at the upper end; and the orbital ring is incomplete. As the oil-gland is present, the formula for *Nasiterna*, adopting the system used by Prof. Garrod in his paper on the anatomy of the Parrots<sup>3</sup>, will be 2, —, —, +, as in *Agapornis*, *Stringops*, *Geopsittacus* and their allies.

Pterylographically, I have been able to ascertain that *Nasiterna pygmæa* agrees generally in the form and disposition of the tracts with such genera as *Cyclopsitta*, *Psittinus*, &c., and differs from the *Cacatuinæ* in the absence of the crest and naked head-space (*cf.*

<sup>1</sup> P. Z. S. 1865, p. 620.

<sup>2</sup> Atti Reale Acad. Torin. xiii. 1878, p. 301.

<sup>3</sup> P. Z. S. 1874, p. 595.



Sclater, *l. c.* p. 622) universally present, as far as I have yet seen, in that group, as also in the absence of powder-down feathers, very frequently, though not invariably, present in those birds, though absent in the other *Psittaci* with "normal" carotids. In the Cockatoos, too, the orbit is completely encircled by bone<sup>1</sup>, and, as a rule, doubly so (*vide* P. Z. S. 1874, pl. lxxi.). In *Nasiterna*, as already stated, it is not so. Of the other "*Palæornithidæ*," as defined by Prof. Garrod, the *Trichoglossinæ* form a well-marked group, characterized by numerous features to which there is no approach in *Nasiterna*.

Its nearest allies must therefore be in the remaining forms of that family, which I propose to call *Eelectinæ*, including all those not either Cacatuine or Trichoglossine, with the exception, perhaps, of the ground-frequenting forms, *Stringops*, *Pezoporus*, &c. The spiny tail-feathers of *Nasiterna* are, no doubt, very peculiar, and with its curious beak and diminutive size must always make this a very well-marked genus. But I fail to see in its spiny tail sufficient importance to elevate *Nasiterna* into a special subfamily, as suggested by Mr. Slater. *Chætura* is not separated on similar grounds from the other *Chæturinæ*; nor has the spatulate tail of *Prioniturus* been advanced as entitling that genus to form a special subfamily.

The anatomy of the small short-tailed genera *Cyclopsitta*, *Psittacella*, &c. is as yet unknown; but I believe that it is amongst these forms—related, as far as can be judged from external appearance, through this last to *Pezoporus*, *Geopsittacus*, &c.—that *Nasiterna* has its nearest allies. *Agapornis* and *Psittinus* are also not very distantly related, though I believe that the loss of its furcula by *Agapornis*, in which it resembles *Nasiterna*, is probably due to independent causes<sup>2</sup>. That the loss of the furcula is *not* exclusively correlated with terrestrial habits is shown by its absence in three such essentially arboreal genera as *Agapornis*, *Nasiterna*, and the Neotropical *Psittacula*.

### 3. On some new and little known Species of *Tineidæ*. By THOMAS, LORD WALSHINGHAM, F.Z.S.

[Received February 17, 1880.]

(Plates XI., XII.)

Genus ADELA, Latreille.

Mr. Walker in his 'Catalogue of Lepidoptera Heterocera in the British Museum,' part xxviii. p. 501, 1863, described three species of the genus *Adela*—*A. purpurea* and *A. bellula* from North America, and *A. albicornis* from Natal. The first of these (*A. purpurea*) has since been described by Prof. Zeller under the name of *Adela*

<sup>1</sup> This was not the case, however, in a specimen of *Calyptorhynchus funereus* lately examined by me.

<sup>2</sup> Judging by its behaviour in captivity, *Agapornis* is extremely sluggish in its movements.

*biviella* (Verh. z.-b. Ges. Wien, xxiii. [1873], p. 226, pl. iii. fig. 10), where it is accurately figured.

The second (*A. bellela*) is closely allied to the European *Adela degeerella* (Linn.), differing only in the richer colouring and in the darker purple hind wings. The longitudinal stripes before and beyond the central band, as well as the margins of the band itself, are very distinct, and of a brilliant shot purplish-blue, whereas these and the central band itself are paler in the European species. The wings are perhaps slightly shorter in proportion to their length than in *A. degeerella*.

The third (*Adela albicornis*), which is very distinct from any other known *Adela*, was first described by Mr. Stainton as *Adela natalensis* (Trans. Ent. Soc. Lond. n. s. vol. v. p. 222), the specimens in the British Museum described by Walker being from Mr. Guenzius's collection, which also supplied some of those described by Mr. Stainton.

Dr. Brackenridge Clemens, Proc. Ent. Soc. Phil. 1864, vol. ii. p. 426, describes *Adela ridingsella* from Virginia.

Prof. Zeller, in the 'Verhandlungen der zoologisch-botanischen Gesellschaft in Wien,' vol. xxiii. (1873), describes *A. biviella* (p. 226, pl. iii. fig. 10) from Massachusetts, above referred to, *Adela chalybeis* (p. 225) from Texas, a species with which I am not acquainted, and *Adela schlægeri* (l. c. p. 227, pl. iii. fig. 11) from Ohio, of which the figure faithfully represents the species under the name of *A. ridingsella* in the collection of the Entomological Society of Philadelphia; and in vol. xxv. p. 342, pl. x. fig. 50, of the same publication he further describes and figures *Adela trigrapha* from California.

Mr. Chambers, in the 'Canadian Entomologist,' vol. v. p. 73, 1873, describes *Adela bella* and *Dicte coruscifasciella*, both from Kentucky. In (Can. Ent.) vol. viii. pp. 103, 104, he describes *Adela* (*Nemotois*?) *trifasciella*, *Adela fasciella* (which he suggests may be the female of the preceding species), and *Adela* "*flammeusella*," all from California.

In (Can. Ent.) vol. ix. pp. 206, 207, he refers to *A. biviella*, Zell., and describes the female of this species (which has a "straw-yellow head") from Maine; he also amends his previous description of *A. bella*, and points out that his "*Dicte* (*Adela*) *coruscifasciella*" is the same species as *Adela schlægeri*, Zell., which it precedes.

The same author, in the 'Bulletin of the United-States Geological Survey,' 1878, vol. iv. no. 1, pp. 127, 128, in his "Index to the described Tineina of the United States and Canada" (in which he omits to notice any of the species described by Mr. Walker), gives a list of the known species of *Adela* from those countries. In this list he sinks his *A. fasciella* as a synonym of *A. trigrapha*, Zell., but retains as a distinct species his *A. trifasciella*, which he had previously suggested might possibly be the male of *A. fasciella*, and alters the spelling of *A. flammeusella* to *A. flamensella*.

After careful comparison of descriptions, of figures, and of type specimens where such has been possible, I would suggest the

following as the correct list and synonymy of the North-American species of this genus.

ADELA RIDINGSSELLA, Clem. Proc. Ent. Soc. Phil. ii. p. 426, 1864; Stainton, Tin. Nor. Am. (republication of Clemens's papers), p. 250; Packard, Guide Stud. Ins. p. 348; Chambers, Bull. U.S. Geol. & Geog. Survey, iv. no. 1, p. 127.

*Dicte coruscifasciella*, Chamb. Can. Ent. vol. v. p. 74, 1873.

*Adela schlægeri*, Zell. Verh. z.-b. Ges. Wien, xxiii. p. 227, pl. iii. fig. 11.

*Dicte (Adela) coruscifasciella*, Chamb. Can. Ent. ix. p. 207.

*Adela (Dicte) coruscifasciella*, Chamb. Bull. U.S. Geol. & Geog. Survey, iv. no. 1, p. 127.

ADELA PORPUREA, Walk. Cat. Lep. Het. xxviii. p. 501, 1863.

*Adela biviella*, Zell. Verh. z.-b. Ges. Wien, xxiii. p. 226, pl. iii. fig. 10, 1873; Chamb. Can. Ent. ix. p. 206; Chamb. Bull. U. S. Geol. & Geog. Survey, iv. p. 127.

ADELA CHALYBEIS, Zell. Verh. z.-b. Ges. Wien, xxiii. p. 225; Chamb. Bull. U.S. Geol. & Geog. Surv. iv. p. 127.

ADELA BELLA, Chamb. Can. Ent. v. p. 73, Can. Ent. ix. p. 207; Bull. U.S. Geol. & Geog. Surv. iv. p. 127.

ADELA FLAMENSELLA, Chamb. Can. Ent. viii. p. 104; Bull. U. S. Geol. & Geog. Surv. iv. p. 127.

ADELA BELLELA, Walk. Cat. Lep. Het. xxviii. p. 501.

ADELA TRIGRAPHA, Zell. Verh. z.-b. Ges. Wien, xxv. p. 342, pl. x. fig. 50, 1875; Chamb. Bull. U.S. Geol. & Geog. Surv. iv. p. 128. (Plate XI. figs. 2, 3.)

♂. *Adela (Nemotois) trifasciella*, Chamb. Can. Ent. viii. p. 103; Bull. U.S. Geol. & Geog. Surv. iv. p. 128.

♀. *Adela fasciella*, Chamb. Can. Ent. viii. p. 103.

ADELA IOCHROA, Zell. Horæ Soc. Ent. Ross. xiii. p. 218.

To the above I may now add the four following from California and Oregon, raising the whole number of species of the genus *Adela* from the United States and Canada to 12 only. It is more than probable that many more yet remain to be discovered.

ADELA SEPTENTRIONELLA, sp. nov. (Plate. XI. fig. 1.)

♂. *Capite et palpis setosis, nigris; antennis longissimis (triente basali supra nigro maculoso) albis; alis anticis subpurpure-scenti-brunneis, fasciis duabus angustis albis, triente apicali squamis albis irrorato, ciliis apicalibus albis; posticis brunneis.*

♀. *Capite ochreo; antennis brevioribus.*

♂. Head and palpi, which project very conspicuously beyond it, roughly clothed with long black hairs. Antennæ more than three times the length of the fore wings, white, spotted with black above along

the basal third. Fore wings brown, with a slight purplish tinge, crossed by two narrow white bars, the inner bar is halfway between the base and the outer bar, which latter is slightly angulated outwards about the middle, and is situated slightly beyond the middle of the wing: beyond the outer bar is a small white angulate spot at the costa midway to the apex; and on the apical portion of the wing are, usually, some scattered small white dots and scales, varying in number and distribution. The cilia above the middle of the apical margins are white. Hind wings brown. Legs brown, tarsi spotted with white.

The female has the head covered with long bright ochreous hairs; the palpi black; antennæ as in the male, but scarcely a third longer than the fore wings; abdomen acuminate, with the anal segments much appressed laterally.

♂ and ♀. Mendocino county, California, May and June 1871, and Southern Oregon, May 1872.

Expanse 11 millims.

ADELA SINGULELLA, sp. nov. (Plate XI. fig. 4.)

♂. *Capite supra nigro, fronte albida; antennis longissimis albis; alis anticis brunneis vix purpurascentibus, fascia singula post medium alba; posticis pupurascentibus.*

♀. *Antennis paulo brevioribus; capite subgriseo, fascia vix latiore.*

♂. Head black above, face greyish, both roughly clothed; the palpi short, depressed, clothed with long black hairs beneath. Antennæ white, more than three times the length of the fore wings, not spotted. Fore wings brown, with a slight purplish tinge; cilia the same, a single narrow white fascia, just beyond the middle, not visible on the underside except in a small costal spot, sometimes slightly angulated below the costa. Hind wings rather more purplish than the fore wings; the costal portion of the base, over which the fore wings lap when the wings are extended, is white. Legs brown; tarsi indistinctly spotted with whitish.

♀. With the head rather greyish, and the fore wings with a more greenish hue than those of the male, having the fascia also slightly wider. Antennæ only slightly shorter than those of the male.

Expanse 10 millims.

This species differs from *Adela sulzella* (Schiff.) in its smaller size, narrower fascia, and in the antennæ of the female being similar to those of the male, instead of being thickened to the middle.

♂, ♀. Mendocino county, California, May 25, 1871.

ADELA LACTIMACULELLA, sp. nov. (Plate XI. figs. 5 & 6.)

♂. *Capite supra purpurascente, fronte et palpis nigro-setosis; antennis albis, apud basin nigrescentibus; alis anticis subviridi-cupreis, maculis duabus costalibus una (nonnumquam secunda) dorsali ochreo-albidis; posticis subpurpureis.*

♀. *Palpis nigris, capite flavo; alis anticis cupreis, maculis duabus costalibus subconspicuis.*

Head purplish above, the face and palpi clothed with long black



hairs; antennæ white, clouded on the basal fourth, but not annulated, with black. Fore wings with the costa slightly raised near the base, greenish cupreous, a yellowish-white spot rather beyond the middle of the dorsal margin and two similar ones on the costa (one before and one beyond the middle), of which the outer one only is visible on the underside; sometimes a small faintly-indicated spot lies above the anal angle. Hind wings purplish, the base of the cilia greenish cupreous. Legs purplish, the tarsi rather grey.

Female with the palpi black, the head roughly clothed with long dark orange-yellow hairs, eyes smaller and wider apart than those of the male, antennæ nearly twice the length of the fore wings. The fore wings with a less greenish and more cupreous tinge than in the male; the dorsal spot obsolete; the costal spots much less conspicuous than those in the male, especially the one nearest the base.

Expanse 14 millims.

♂, ♀. Mendocino County, California, June 10, 1871.

ADELA SIMPLICIELLA, sp. nov. (Plate XI. fig. 7.)

♂. *Capite hirsuto, ochreo; antennis vix longioribus quam alæ, fuscis; alis anticis subviridi-cupreis, apud costam et apicem purpurascens, posticis purpureis.*

♀. *Antennis aliquot brevioribus.*

♂. Head roughly clothed with ochreous hairs above, the face rather smoother; palpi sparsely clothed with long hairs below, the apical joint smooth; antennæ about the length of the fore wings, purplish fuscous. Fore wings greenish cupreous towards the base, tinged with purple, especially on the costal and apical portions of the wing. Hind wings purplish; legs purplish; tarsi slightly paler; undersides of both dull brownish purple.

The female apparently differs from the male only in the length of the antennæ, which are about two thirds the length of the fore wings.

Expanse 10 millims.

♂, ♀. Southern Oregon, May 1872.

Allied to *Adela rufimetrella* (Scop.) and *A. violella* (Tr.).

I may now add to the Indian species of this group two new species received from the Rev. H. Hocking of Dharmasala:—

ADELA GEMMELLA, sp. nov. (Plate XI. fig. 8.)

♂. *Antennis longissimis, roseo-cupreis, articulo basali cum capite supra et infra metallice roseis; palpis brevibus, albido-flavidis; alis anticis triente basali flavo, strigis longitudinalibus tribus roseo-aureis, deinde ad apicem nitide roseo-aureis excepta fascia mediana flava utrinque atro marginata; posticis brunneo-cupreis, ciliis paulo pallidioribus.*

Antennæ nearly four times the length of the fore wings, shining, rosy cupreous, the basal joint brilliant, rosy metallic. Head smooth, shining, metallic above and below, a fringe only of short rough hairs



surrounding the eyes; palpi pale yellowish, short, not projecting beyond the head, having a few long hairs on the underside. Thorax brilliantly metallic rosy golden. Fore wings with the basal third dull yellow, longitudinally streaked with three brilliant metallic blue and rosy lines—one along the costa, one on the middle, and one above the dorsal margin; these are blended in a brilliant rosy metallic band, which precedes a yellow central fascia, margined narrowly on its outer, more widely on its inner edge with black; this fascia is narrow towards the dorsal, widening towards the costal margin; beyond it the remaining portion of the wing, to the end of the cilia, is brilliantly golden, shot with rosy purple.

♂. Expanse 13 millims.

I received several males of this most beautiful species from the Rev. H. Hocking, from Dharmsala, in the Punjab. It is probably allied to *Adela orientella* (Staud.).

*ADELA GRISEELLA*, sp. nov. (Plate XI. figs. 9 & 9a.)

♂. *Antennis longissimis, griseo-albidis excepta basi cuprea, palpis brevibus, capite pæne nudo; alis anticis griseo-albidis subpurpureis atomis irroratis, fascia mediana interne nigro marginata alba, posticis dilute brunneis.*

♀. *Antennis flocco ultra medium incrassatis, cupreis, triente apicali nudo albido.*

♂. Antennæ nearly three times the length of the fore wings, greyish white shaded with cupreous at the base; palpi short and inconspicuous, whitish; head nearly smooth, greyish white. Fore wings greyish white, profusely irrorated, especially towards the apex, with purplish cupreous scales, with a slightly bowed median fascia of almost uniform width, dark-margined on its inner edge. Hind wings very pale brownish. Legs brownish cupreous, the tarsi spotted with white.

♀. Antennæ about the length of the fore wings, clothed, except the whitish apical third, with cupreous scales, which form a thick tuft at about two thirds of their length.

Expanse 13 millims.

Dharmsala, Punjab. Received from the Rev. H. Hocking.

#### Genus INCURVARIA, Haworth.

*INCURVARIA SOLENOBIELLA*, sp. nov. (Plate XI. fig. 10.)

♀. *Capite hirsuto, albido; alis anticis cum ciliis albidis, squamis subnitide æneis irregulariter conspersis, posticis cum ciliis dilute griseo-cinereis.*

Head and palpi whitish. Antennæ cinereous, somewhat annulated with whitish towards the base in the female, slightly pubescent in the male. Fore wings whitish, thickly sprinkled with rather shining, yellowish, brassy scales, more conspicuous in the female than in the male, and grouped into irregular blotches, especially along the apical margin and about the middle of the wing; cilia whitish. The hind wings are pale greyish cinereous; the cilia the same. The male

is slightly larger than the female, and has much the appearance of a *Solenobia*, especially when slightly worn.

Expanse, ♂ 18 millims., ♀ 16-17 millims.

Near San Francisco, May 19th, 1871.

I have several specimens of this species, of which the females are in better condition than the males. One, or perhaps two other unicolorous species of *Incurvaria* were met with in May and June of the following year in Oregon; but I shall not venture to describe them until I can be more certain that they do not belong to some of the numerous European species.

#### Genus MICROPTERYX, Hübner.

Two species only of this genus have, as far as I am aware, been described from North America; and of these one only is mentioned in Chambers's "Index to described *Tineina*," in the 'Bulletin of the United-States Geological and Geographical Survey,' 1878. This is *Micropteryx pomivorella*, Pack. (Rep. Mass. Ag. Soc. 1870, Am. Nat. vi. p. 685). The other is *Micropteryx luteiceps*, Walk. (Cat. Lep. Het. xxviii. p. 494), from Nova Scotia, a good and distinct species.

To these may be added the following species from the Western States:—

#### MICROPTERYX PARDELLA, sp. nov. (Plate XI. fig. 11.)

*Capite hirsuto ochreo; antennis fuscis; alis anticis subpurpurascenscupreis, litura dorsali apud basin et maculis duabus post medium aliquando confusis, cum ciliis apicalibus ceneo-flavidis, posticis cupreis.*

Head bright ochreous, roughly clothed. Antennæ dusky, rather coarse in the male. Fore wings purplish cupreous, with two conspicuous brassy-yellow spots beyond the middle; the upper of these, which is the largest, is obliquely quadrangular, reaching the costa along its upper edge, and sometimes blended with the lower and smaller one, which is slightly beyond it and contiguous to the dorsal margin at the anal angle. Before the middle, touching the dorsal margin, and reaching more than half across the wing, is an irregular-shaped spot of a similar colour, blending by means of a yellowish intermediate shade with a small similar spot at the base of the wing. The cilia at the apex and apical margin are brassy yellow, at the anal angle cupreous. Hind wings cupreous. Abdomen dusky.

♂. Expanse 10 millims.

Five specimens, taken on the borders of the forest of "redwood" (*Taxodium sempervirens*) near the coast, in Southern Oregon, at the beginning of June 1872.

#### MICROPTERYX AUROPARSELLA, sp. nov. (Plate XI. fig. 12.)

*Capite subgriseo; antennis brevibus, cinereo-fuscis; alis anticis purpureis, squamis aureo-metallicis creberrime conspersis, posticis purpureis.*

Head rough, greyish. Antennæ short, less than half the length

of the fore wings, dusky. Fore wings bright purple, thickly and regularly sprinkled with bright golden metallic scales; the cilia mixed purple and golden. Hind wings purple.

Expanse  $7\frac{1}{2}$  millims.

A small but distinct species, about the size of *M. calthella*.

One specimen, taken in Southern Oregon in May 1872.

I have a single specimen of another undescribed species from Northern Oregon, April 1872, but scarcely in sufficiently good condition to be determined with certainty.

Head dusky greyish. The fore wings purple, dusted with thickly scattered yellowish and whitish scales, giving a slightly blotched appearance, and forming an ill-defined spot on the dorsal margin before the anal angle. The cilia are pale, and the hind wings very transparent cinereous.

Expanse 9 millims.

Apparently allied to the European *M. unimaculella*.

I leave it to be named by any one who may be able to verify the description by obtaining a series of specimens in better condition.

#### Genus HYPONOMEUTA, Zeller.

Mr. Walker, in his 'Catalogue of Lepidoptera Heterocera in the British Museum,' part xxviii. p. 530, describes *Hyponomeuta ordinatellus* ♂ and ♀, of which he says:—"Alæ posticæ nigricanti-cinereæ, fimbria alba;" and in part xxx. p. 1016, he mentions *Hyponomeuta "multipunctellus,"* Clem., and refers his *H. ordinatellus* to this species. Dr. Clemens described his *H. multipunctella*, in the 'Proceedings of the Academy of Natural Sciences of Philadelphia' for 1860, p. 8, as having the hind wings "blackish grey," but without mentioning the sex of his type. The single specimen placed by Mr. Walker under the two names—first, *ordinatellus*, Walk., and secondly, *multipunctellus*, Clem.—has decidedly white hind wings, and is therefore evidently not one of those from which the original description was made, and which were said to have come from Canada. A reference to the Register shows that the specimen was "purchased from Mr. Dyson," in a miscellaneous collection of North-American insects. It is probably the one mentioned by Mr. Walker (erroneously) as having been "presented by Mr. Doubleday," since he only refers to one specimen as existing in the national collection, and no other can be found. If this specimen is a female (of which I am not at present absolutely convinced), it will agree with Prof. Zeller's redescription of *H. multipunctellus*, Clem., in the Verh. z.-b. Ges. Wien, xxiii. p. 228, where he writes:—"Post. ♂ dilute cinereis albo ciliatis, ♀ totis albis." Prof. Zeller points out that if Walker's original *H. ordinatellus* had the hind wings dark in both sexes, it cannot be the same species as *H. multipunctella*, Clem. There must, then, be two distinct species agreeing in all other particulars; and this remains to be proved. But it seems more probable that Mr. Walker may have been mistaken as to the sex of one of his ori-

ginal types, especially as he himself subsequently referred a specimen with white hind wings to the same species. I have a female with white hind wings in my own North-American collection.

#### Genus ANESYCHIA, Hübner.

In the "Index to the described *Tineina* of the United States and Canada," given by Mr. Chambers in the 'Bulletin of the U.S. Geological and Geographical Survey,' vol. iv. (1878), in enumerating the species which have been placed in the genus *Anesychia*, he includes "*A. sparsicella* (sic), Clem." (Proc. Ent. Soc. Phil. ii. p. 430), described from specimens in the collection of the Entomological Society of Philadelphia. This species should be placed in the genus *Cryptolechia* (Zell.). It is the *Cryptolechia contrariella* of Walker's 'Catalogue,' part xxix. p. 771, the preface of which is dated March 7th, 1864—the same month in which Dr. Clemens's description appeared. The same species is also described and figured by Prof. Zeller (Verh. z.-b. Ges. Wien, xxv. pp. 343, 344, pl. x. fig. 51) under the name of *Cryptolechia atropicta*; the only difference appears to be the absence in this figure and description of a small black spot at the base of the dorsal margin, which exists in Clemens's and Walker's specimens.

If I am correct in believing the three authors above quoted to refer to the same species, its synonymy would be as follows:—

CRYPTOLECHIA CONTRARIELLA, Walk. Cat. Lep. Het. xxix. p. 771.

*Anesychia sparsiciliella*, Clem. Proc. Ent. Soc. Phil. ii. p. 430; Stainton, Tin. N. Amer. p. 255.

*Cryptolechia atropicta*, Zell. Verh. z. b. Ges. Wien, xxv. pp. 343, 344, pl. x. fig. 51.

*Anesychia sparsicella*, Cham. Bull. U.S. Geol. and Geog. Surv. iv. p. 129.

ANESYCHIA HAGENELLA, Chambers, Bull. U.S. Geog. and Geol. Surv. iv. p. 81.

This species seems to be nearly allied to *Psecadia semilugens*, Zell., = *Anesychia multipunctella*, Cham. (non *Hyponomeuta multipunctella*, Clem.), and should perhaps more properly be placed with some of its allies in the genus *Psecadia* (Hübner).

#### Genus PSECADIA, Hübner.

Zeller, in the 'Horæ Soc. Ent. Ross.' xiii. pp. 235, 236, pl. iii. fig. 71, describes and figures *Psecadia xanthorrhœa*, from Porto Rico. A comparison of the figure, which is very accurate, with a specimen in the British Museum shows this to be the species described by Walker (Cat. Lep. Het. xxviii. p. 536) as *Psecadia notatella*, from St. Domingo.

The following new species, belonging to the genera *Hyponomeuta* and *Psecadia* are at present in my collection. I have also here



described two new species of the genus *Lampronia*, Zell., from North America, of which no examples, as far as I am able to ascertain, have hitherto been observed in that country.

Genus *HYPONOMEUTA*, Zeller.

*HYPONOMEUTA LAPIDELLUS*, sp. nov. (Plate XII. fig. 1.)

*Capite, antennis et palpis dilute griseis; alis anticis saturate plumbeo-griseis, punctis sex in dimidio basali, quatuor in dimidio apicali nigris pallide submarginatis, octo in marginibus apicali et costali dispositis; posticis subgriseis; abdomine ochreo.*

Head stone-grey, palpi projecting scarcely half the length of the head beyond it, the apical joint rather more than half the length of the second, both stone-grey. Antennæ the same. Thorax with two black spots in front and one behind; the wing-coverts tipped with black. Fore wings rather shining, cold stone-grey, with eighteen black spots, indistinctly and narrowly pale-margined, arranged as follows—two rather elongate, below the basal third of the costa, two on the lower edge of the cell, also before the middle, one on the middle of the cell beyond them, and one near the base of the dorsal margin, with a group of four on the outer third of the wing, which are followed by eight marginal spots, of which five belong to the apical and three to the costal margin. Hind wings pale greyish. Abdomen and tuft ochreous. Legs grey.

Expanse 19 millims.

Larva pale yellowish ochreous, with a double row of elongate black spots just touching each other on the middle of each segment, and connected by a slender black subdorsal line, except between the third and fourth segment, where it is interrupted by a band of the pale ground-colour. Below the subdorsal line is a row of reniform black spots on each segment after the fourth. Head black; second segment with two brownish-fuscons plates divided by a yellowish line. Anterior legs black; prolegs yellowish ochreous; a few single scattered hairs on each segment.

Received from the Rev. H. Hocking, who found the larvæ at an elevation of about 4500 ft. near Dharmasala, July 12th, feeding on "soongroo" (wild salvia). The moths emerged on the 1st of August.

Genus *PSECADIA*, Zeller.

*PSECADIA? CUPREONIVELLA*, sp. nov. (Plate XII. fig. 2.)

*Capite et thorace niveis; palpis subpurpureis, albo-acuminatis; alis anticis cupreo-violaceis, guttis sex distinctis aliis aliquot confusis irregulariter dispersis niveis, costæ basi cærulea; posticis dilute griseo-brunneis, basi albida; abdomine grisescenti-brunneo, flocco anali aurantiaco.*

Head, thorax, and patagia white. Antennæ pale greyish brown, the basal joint slightly thickened, dark purplish. Palpi slender, the apical joint rather more than half the length of the second joint, purplish, with the extreme tip white; second joint purplish above, white



below. Tongue scaled with white at the base. Fore wings glossy cupreous violet, with large shining snow-white spots and blotches; six spots on the basal half and middle of the wing (three upon and three below the cell) well defined and separate, others along the costa and on the apical third of the wing contiguous to the anal angle more or less blended and irregular; a white spot on the middle of the base is blended with another at the base of the dorsal margin; above it, on the costa, and beyond it, on the median vein, are shades of dark glossy blue, which are also to be found on the lower half of the apical margin above the anal angle. The costa, except at the extreme base, is white; the cilia white, tinged around the apex with greyish brown at their tips. Hind wings pale greyish brown, rather whitish, but not quite transparent towards the base. Abdomen greyish brown, whitish beneath; the anal tuft orange-ochreous. The femora of the first pair of legs are orange-ochreous beneath; the tibiæ and tarsi greyish brown beneath, white above. The second and third pairs of legs have the base only of the femora orange-ochreous, the tibiæ and tarsi spotted with purplish brown.

1 ♀. Expanse 28 millims.

Rio do Espirito Santo, Brazil.

I have been unable to find any figure or description of this beautiful Brazilian species. It seems to agree more nearly with *Psecadia* (Zeller) than with any other genus; but there is a slight difference in the neuration of the hind wings; moreover the head is slightly broader and the antennæ longer than in the European and North-American forms of that genus. It differs from the genus *Oeta* (Grote) in having veins eight and nine of the fore wings arising from a common pedicle, not separately, as in that genus, agreeing in this respect with *Psecadia*, where I would place it at least provisionally.

*PSECADIA MONTICOLA*, sp. nov. (Plate XII. fig. 3.)

*Capite, antennis et palpis obscure schistaceis; alis anticis schistaceis, lineis punctisque nigris in longitudinem impositis; margine dorsali anguste nigro, punctis marginalibus nigris undecim secuto; posticis fuligineis; abdomine (excepta basi nigra) et tibiis posticis flavis.*

Head, antennæ, and palpi dark slaty grey, the latter upturned, with the apical joint long and pointed. Fore wings rather shining, dark slaty grey, with black spots and streaks, four on the basal half along the lower edge of the cell; two attenuated streaks on the outer edge of the cell, with three immediately beyond it, of which the upper one is the longest and is sometimes joined to the upper of the two on the cell; three oblique streaks below the costa, of which the outer one is the shortest and most oblique, the inner one the reverse. These are followed by a series of four spots along the apical portion of the costa, and seven similar spots along the apical margin, reaching to the anal angle, from which a narrow black line runs along the dorsal margin to the base. Hind wings dark smoky grey; the cilia the same except at the abdominal margin and angle, where they are

pale ochreous. Abdomen bright orange-ochreous, except at the extreme base, which is blackish. First and second pair of legs, together with the underside of the wings, dark smoky grey; the first pair with indistinct pale spots at the joints; third pair bright orange-ochreous; the tarsi with blackish annulations.

Expanse 25 millims.

♂. Taken on the Siskiyou range of mountains on the borders of California and Oregon, June 10th, 1872. Allied to the European *Psecadia chrysopyga* (Zell.), and approaching in appearance *Anesychia cirrhocnemis*, Led., Horæ Ent. Soc. Ross. viii. p. 25, pl. ii. fig. 8.

*PSECADIA ARCTOSTAPHYLELLA*, sp. nov. (Plate XII. fig. 4.)

*Capite subcæruleo-albo, antennis, excepta basi supra albida, fuscis; thorace sexpunctato; alis anticis subcæruleo-albis, minus apud costam, præcipue apud cellulam squamis fumosis adumbratis; punctis marginalibus nigrescentibus undecim; posticis subflavescenti-griseis; abdomine ochraceo, tibiis posticis ochraceis, tarsis nigro annulatis.*

Head bluish white; antennæ fuscous, with some white scales above at the base; palpi bluish white, shaded on their outer sides with blackish scales. Thorax bluish white, with six black spots, three on each side, and a few black scales forming an indistinct spot at the back of the head. Fore wings bluish white; the costal half is much occupied by smoky blackish scales, which form a strong shade along the middle of the wing from the base to the end of the cell, and a slight shade projecting downwards beyond it; the dorsal half is of the plain bluish white ground-colour, into which the median shade gives out a slight projection about the middle of the wing, and a small semi-detached spot pointing inwards nearer to the base; along the apical margin are ranged eight or nine blackish spots, with two or three more indistinct ones along the costa near the apex; cilia greyish. Hind wings grey with a slight yellowish tinge; cilia yellowish, especially at the abdominal margin. Abdomen yellow, shaded with greyish at the base. First and second pairs of legs blackish, the tarsi with white annulations; third pair of legs yellow, the tarsi with blackish annulations.

Expanse 22 millims.

This species is nearly allied to *P. bipunctella* (Fab.), but it differs in the bluish white, not pure white, ground-colour of the fore wings, and in the less intense black and somewhat different form of their shaded portion, which is much paler towards the costa than in that species, differing also in this respect from *Anesychia hagenella* (Cham.), as well as in its larger size.

I met with the species above described in Mendocino and Lake counties, California, in the middle of June 1871, and bred one specimen on the 18th of June from a pupa found near San Francisco on the 20th of May, in a delicate cocoon in a leaf of *Manzanita* (*Arctostaphylos glauca*, Lindl.), which the imago frequents.

## PSECADIA SUBCÆRULEA, sp. nov. (Plate XII. fig. 5.)

*Præcedenti affinis; alis anticis subcæruleo albis, lineis et maculis irregularibus fumosis præcipue supra trientem dorsalem conspersis; margine dorsali peranguste fumoso.*

This species differs from the last named (*Psecadia arctostaphylella*) in its slightly larger size, and in the absence of any generally connected shade over the costal half of the fore wings. This is as it were replaced by a series of disconnected smoky blackish streaks of varying size and distinctness. The most noticeable of these are an elongate shade from the base immediately below the costa; a short oblique dash below it also on the basal third of the wing. One or two semiconnected parallel streaks along the cell about the middle of the wing; a spot, with three projecting limbs on its outer side, lying between the lower angle of the cell and the anal angle, and a very slender blackish line all along the dorsal margin. The veins surrounding the cell are also more or less indicated by lines of blackish scales. In some varieties, perhaps slightly worn, the markings are much less distinct than in others.

It is nearly allied to *P. arctostaphylella*, and frequents the same probable food-plant, so that a comparison of the larvæ would be interesting, in order to establish or to refute the distinctness of the two species; but it differs, as I have shown, in having no distinctly separate pale and dark portions on the fore wings; and, moreover, in the slender line along the dorsal margin, which does not occur in that species.

Expanse 25 millims.

♂ ♀. Sonoma and Mendocino counties, California, May 23rd and June 13th, 1871.

## PSECADIA ALBISTRIGELLA, sp. nov. (Plate XII. fig. 6.)

*Capite et thorace subnigrescenti-brunneis, linea alba circumcinctis; alis anticis subnigrescenti-brunneis, striga submedia angusta alba a basi ad finem cellulæ producta furcam brevem gerente, punctis novem marginalibus nigris, posticis paulo pallidioribus; abdomine (postice) et tibiis posticis flavis.*

Head blackish brown, with a white line on each side above, which is carried round the blackish-brown thorax, forming an angle behind it, with the apex pointing forward. Palpi blackish brown, the apical joint upturned, long, and pointed, a small white spot at the junction of the second and third joints. Antennæ more than half the length of the fore wings, blackish brown. Fore wings blackish brown, a narrow white steak of even width running from the base along the lower edge of the cell, and terminating in a short fork at its lower external angle; the lower half of the fork is sometimes obsolete; there is a row of nine black dots preceding the cilia, three on the costal and six on the apical margin. Hind wings and cilia very slightly paler than the fore wings. Abdomen bright orange-ochreous except at the base, which is blackish brown. Legs blackish, except the third pair, which are bright orange-ochreous, and have the ex-

tremity of the tarsi spotted with blackish brown. Underside of wings uniformly dull smoky brown.

Expanse 15 millims.

♂ ♀. Taken on the Siskiyou Mountains, on the borders of California and Oregon, June 8th, 1872, at an elevation of about 6000 ft. A very distinct and interesting little species of the group to which belong *P. chrysopyga* and *P. monticola*.

*PSECADIA ERMINEELLA*, sp. nov. (Plate XII. fig. 7.)

*Capite et thorace griseo-albidis, hoc uno, illo quatuor punctis nigris impositis; alis anticis griseo-albidis, maculis tredecim mediis, decem minoribus marginalibus nigris; posticis dilute griseis, ciliis pallidioribus.*

Head greyish white, with a black spot above between the antennæ. Palpi greyish white, with a black band round the base of the apical joint. Antennæ blackish. Thorax greyish white, with four black spots, one in front, one at each side, and one larger and more conspicuous than the others behind. Fore wings greyish white, with thirteen black spots on their surface, some of which are elongate, besides ten smaller marginal spots, of which four are on the costal, six on the apical margin; the first black spot is at the base, beneath the costa, the second on the costa; slightly beyond these two, somewhat diffused beneath them, is a smaller one at the base of the cell, followed by four more along its lower edge, of which the second is rather lower than the others; the two largest and most conspicuous spots are elongate, and situated on the cell; these are followed by a smaller one beyond it, and above them are the three remaining subcostal spots. Hind wings pale greyish, with whitish-grey cilia. Abdomen and legs whitish grey. Underside of fore wings brownish grey.

Expanse 22 millims.

Received from the Rev. H. Hocking, from Dharmasala, in the Punjab.

*PSECADIA HOCKINGELLA*, sp. nov. (Plate XII. figs. 8, 9, & 9 a.)

*Capite et thorace dilute schistaceo-griseis, palpis albido-griseis, nigro annulatis; alis anticis dilute schistaceo-griseis, punctis elongatis et strigulis nigris in longitudinem diverse dispositis, et punctis duodecim marginalibus; abdomine cum tibiis posticis flavis, tarsis posticis albo nigroque annulatis.*

Head pale slaty grey. Palpi whitish grey, with two black annulations on the second and one on the apical joint. Antennæ dusky greyish, the basal joint touched with black. Thorax pale slaty grey, with six black spots, besides two more minute ones at the base of the patagia, arranged as follows—one in front, one on each side, and three placed in the form of a triangle behind. Fore wings smooth, rather shining, pale slaty grey, with numerous black slender streaks and elongate black spots, a black elongate spot at the base of the costa, six slender subcostal streaks, below them a long slender streak running from before the middle of the wing nearly



to the apical margin, with a semi-detached elongate spot at the upper edge of its inner extremity, a small detached streak lying above its outer extremity. At the base of the wing is a small spot, followed by one long and two shorter streaks along the lower edge of the cell, beneath which are three spots, the second and third sometimes connected by an arched line. A reduplicated spot lies above the anal angle, and a small single spot at the base of the dorsal margin. Besides these there are eight small spots along the apical margin, and four on the costal side of the apex. Hind wings pale grey, cilia slightly paler. Abdomen bright orange-ochreous. The first and second pairs of legs grey, annulated with black, the third pair bright orange-ochreous; the tarsi annulated with black and white.

Expanse 30 to 32 millims.

♂ and ♀ and beautifully preserved larvæ received from the Rev. H. Hocking of Dharmasala, in the Punjab, a most energetic collector and careful observer, after whom I have much pleasure in naming this species, whilst acknowledging his kind and much-valued assistance.

Larva pale yellow and black, with a tinge of orange at the side of each segment. Head black, with a pale yellowish stripe across the face, second segment orange and black. Along the middle of the back is a row of conspicuous pale yellow spots, two on each segment after the third, the anterior spot slightly indented at the sides and behind, sharply indented in front with black, the second somewhat square, with a black spot in its centre. On each side of the back is a reduplicated black stripe, containing about three pale yellowish spots on each segment. The sides of the segments about the spiracles are pale yellowish with an orange tinge, spotted with black; and above the legs runs a narrow black festooned stripe. There are several wart-like tufts of thinly growing hairs on each segment. Anterior legs black, prolegs pale yellowish.

Found April 26th, at an elevation of about 4000 feet, feeding on "Poonah," probably *Ehretia serrata*, Rox., one of the Boraginæ.

Mr. Hocking says of this larva:—"On Poonah tree, wonderfully active, with a snake-like action, exceedingly swift, either backwards or forwards, at pleasure; spun up the 3rd of May, came out 4th to 9th of June."

#### LAMPRONIA, Zeller.

LAMPRONIA OREGONELLA, sp. nov. (Plate XII. fig. 11.)

*Capite supra hirsuto flavo, antennis pubescentibus albo et fusco annulatis; alis anticis brunneis, fasciis duabus et puncto costali ante apicem cum ciliis canis, posticis cinereis.*

Head orange-yellow, very rough above, smoother in front. Antennæ of the male pubescent, scarcely half the length of the fore wings, annulated with white and fuscous. Fore wings brown, with two fasciæ and a costal spot white, a fascia at the basal fourth pointing obliquely inwards from the costa, and wider on the dorsal margin; another fascia, slightly beyond the middle, which appears

to consist of two elongate triangular spots, one on the costal and one on the dorsal margin, joined on the middle of the wing by a narrow streak running inwards and upwards, and connecting the apex of the dorsal spot with that of the costal; halfway between the fascia and the apex is a small elongate white costal spot; the cilia are also white, except at the angle, where they are brown. Hind wings greyish cinereous.

Expanse 22 millims.

1 ♂, reared from a larva found boring in the stems of a species of Saxifrage, on rocks near Canyon City, on John Day's River, Oregon, March 30, 1872; bred May 22nd. The larva, which I did not describe at the time, has much the habit of that of *Lampronia rubiella* (Bjerk.), boring in the inside of the stems of its food-plant, the empty pupa-case protruding from the injured shoot.

LAMPRONIA TRIPUNCTELLA. (Plate XII. fig. 10.)

*Capite hirsuto flavo; antennis fusco et albo annulatis; alis anticis subpurpurescenti-brunneis, fascia basali, maculis (duabus costalibus, una dorsali) triangularibus cum ciliis subflavescenti-albidis, posticis subpurpurascensibus.*

Head rough above, yellow. Antennæ faintly annulated with white and fuscous. Fore wings rather purplish brown, with a faintly yellowish white fascia on the basal fourth, somewhat wider towards the dorsal margin, and with two costal and one dorsal spot of the same colour, all somewhat triangular, of which the dorsal (which is beyond the middle) is the largest, and the outer costal is the smallest; the cilia also faintly yellowish white, except at the anal angle. Hind wings pale purplish, with slightly paler cilia.

Expanse 14 millims.

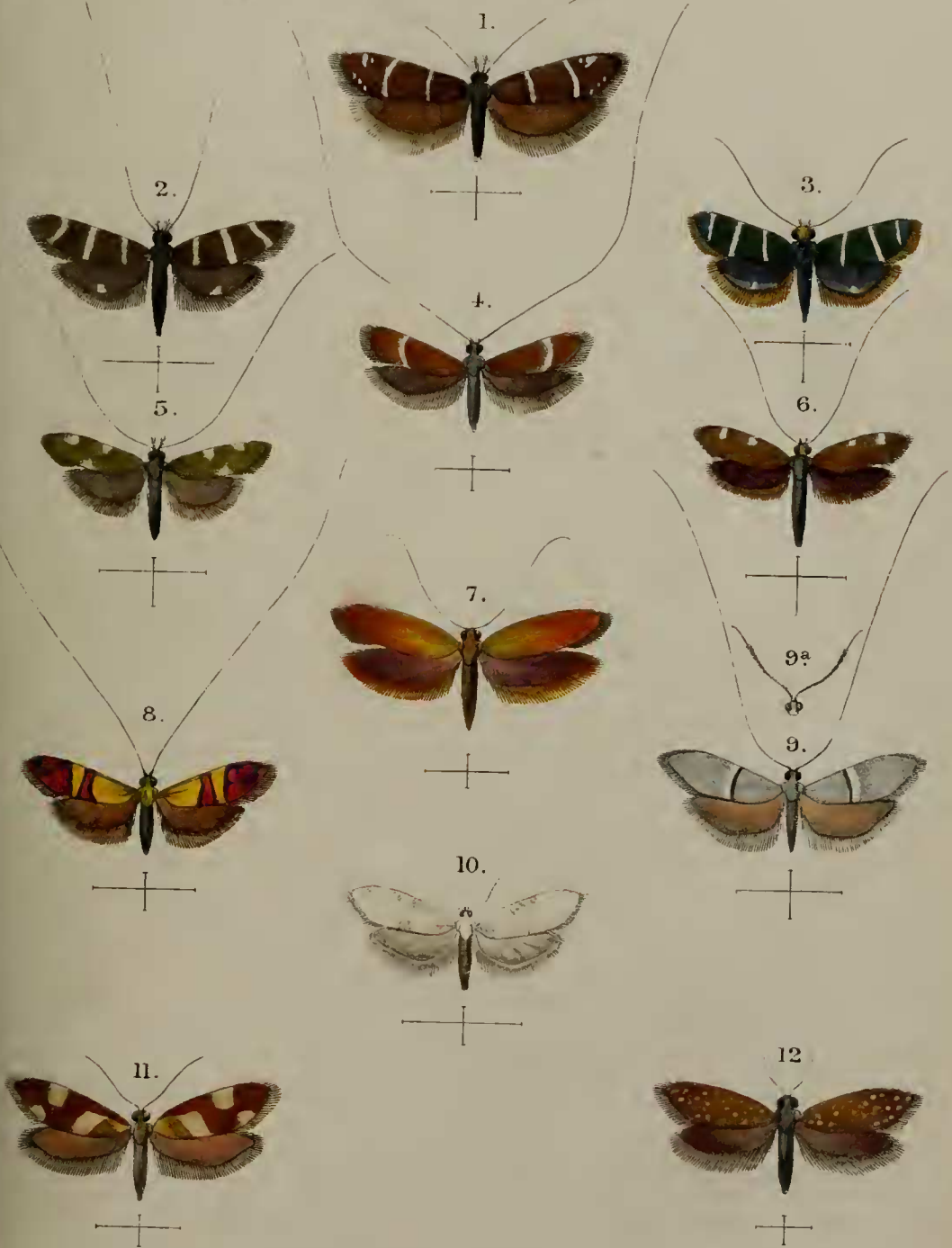
One specimen, purchased in a miscellaneous collection from North America. No exact locality given.

The ornamentation of this species reminds one much of Herrich-Schäffer's figure 275 of *Tinea vinculella*, H. S., which, however, is a much smaller insect and has not white cilia.

EXPLANATION OF THE PLATES.

PLATE XI.

- Fig. 1. *Adela septentrionella* ♂, p. 79.  
 2. — *trigrapha* (Zell.) ♂, p. 79.  
 3. — — ♀, p. 79.  
 4. — *singulella* ♂, p. 80.  
 5. — *lactimaculella* ♂, p. 80.  
 6. — — ♀, p. 80.  
 7. — *simpliciella* ♂, p. 81.  
 8. — *gemmella* ♂, p. 81.  
 9. — *griseella* ♂, p. 82.  
 9a. — —, head and antennæ of ♀.  
 10. *Incurvaria solenobiella* ♀, p. 82.  
 11. *Micropteryx pardella*, p. 83.  
 12. — *aurosarsella*, p. 83.



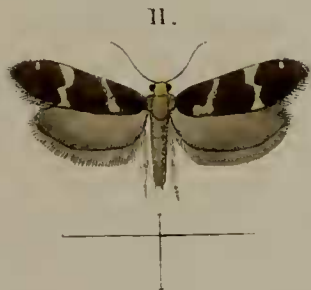
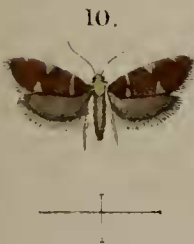
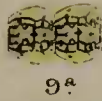
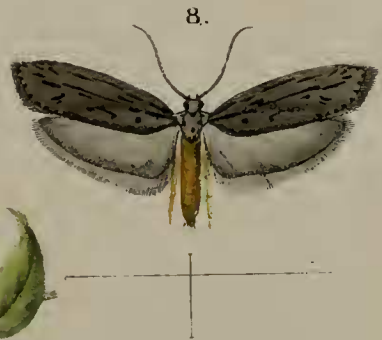
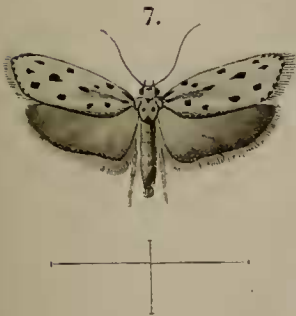
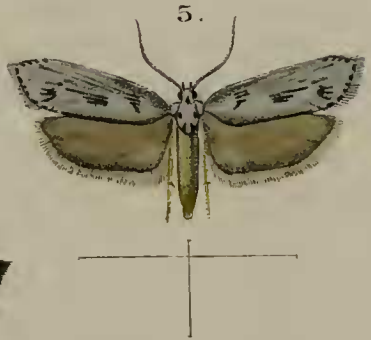
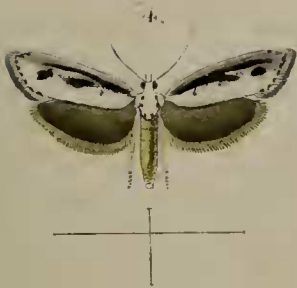
Edwin Wilson, del et lith.

NEW SPECIES OF TINEIDÆ.

Mintern Bros, imp.









## PLATE XII.

- Fig. 1. *Hyponomeuta lapidellus*, p. 86.  
 2. *Psecadia*? *cupreovivella*, p. 86.  
 3. *Psecadia monticola*, p. 87.  
 4. — *arctostaphylella*, p. 88.  
 5. — *subcærulea*, p. 89.  
 6. — *albistrigella*, p. 89.  
 7. — *ermineella*, p. 90.  
 8. — *hockingella*, p. 90.  
 9. — —, larva slightly enlarged.  
 9a. — —, back view of two segments, much enlarged.  
 10. *Lampronia tripunctella*, p. 92.  
 11. — *oregonella*, p. 91.

## 4. On the Synonymy of the Kaffir Craue.

By W. B. TEGETMEIER, F.Z.S.

[Received February 17, 1880.]

The Kaffir Crane is usually termed *Balearica regulorum* (Licht.), apparently on the authority of Mr. E. T. Bennett, Vice-Secretary of this Society, who, at the meeting held on November 12, 1833, "exhibited specimens of Crowned Cranes from Northern and from Southern Africa, with the view of illustrating the characters which distinguish as species the birds from these several localities. Their specific distinction, he stated, on the authority of Professor Lichtenstein, had been pointed out, nearly thirty years since, by the Professor's father, who gave to the Cape bird the name of *Grus regulorum*; this distinction has, however not been generally known among ornithologists, although to those connected with the Society it has for some time been familiar, from observation both of numerous skins and of living individuals. In the bird of North Africa, for which the specific name of *pavoninus* will be retained, the wattle is small, and there is much red occupying the lower two thirds of the naked cheeks; in that of South Africa the wattle is large, and the cheeks are white, except in a small space at their upper part; the neck also is of a much paler slate-colour than that of the North-African species" (Proc. Zool. Soc. 1833, p. 118).

In this communication Mr. Bennett adopted the generic name *Anthropoides*, Vieill., Mr. Gray advocating the retention of the name *Balearica*; but in the 'Gardens and Menagerie of the Zoological Society,' 1835, Mr. Bennett described one species only, which he called *Balearica pavonica* (Fig.); and for this he gave a figure of the Kaffir Crane!

Neither does the name appear to have been employed by the elder Lichtenstein; for the "Cat. Dupt. Berl. Mus. 1793," quoted by Layard in his 'Birds of South Africa,' appears to be a combination of the Latinized title of 'Verzeichniss der Doubletten des zoologischen Museums der königl. Universität zu Berlin, von Dr. H. Lichstenstein,' Berlin, 1823, in which the species is not named, with the date of the following—'Catalogus rerum naturalium rarissimarum,

Hamburgi, d. xxi. October, 1793, auctionis lege distrahendarum,' with preface by M. Ant. Aug. Hen. Lichtenstein, Rector der Johannis-Schule, Berlin. A copy of the latter catalogue exists in the Banksian Library; and in it the Western Crowned Crane is included under the generic name of *Ardea*, and the Kaffir Crane is described as follows:—

“284 A. !! *Ardea chrysolpelargus, nobis. Ardea oculorum area nuda; corpore supra item collo et pectore ex fusco æneo; subtus albo. Rostrum fere 10 pollices longum rubrum basi exalbidum. Nares lineares ultra 4 pollices longæ, mandibulam superiorem in medio quasi sulco pervio dirimunt. Genæ et collum purpureo nitore fulgent, reliquum corpus, quatenus ex æneo fuscum est viridi splendore renidet. Remiges nigræ; rectrices supra sunt aenæ, infra ut venter et crissum albert. Pedes 29 pollices longi, pallide rubri. Digiti antici basi palmati, posticus brevis terram tamen attigens. Longitudo universa 4 pedum 6½ pollicum. Habitat in terra Cafrorum.”*

Consequently it appears that, if the rules of the usually accepted code of nomenclature are to be carried out, the name of this species must be changed from *B. regulorum* to *Balearica chrysolpelargus* (Licht.)—the meaningless name *regulorum* being apparently, as suggested by Mr. Selater, a corruption of the term *oculorum* in A. A. H. Lichtenstein's description.

5. On the Land-Shells, extinct and living, of the Neighbourhood of Menton (Alpes Maritimes); with Descriptions of a new Genus and of several new Species. By GEOFFREY NEVILL, C.M.Z.S.\*

[Received February 13, 1880.]

(Plates XIII., XIV.)

I cannot do better than commence by acknowledging, in the warmest manner, the great obligation I am under to two gentlemen for their cordial assistance and cooperation in collecting and determining the material of this paper. In the first place my thanks are due to my friend Mr. T. B. Coombe Williams, M.A., who during the winter and spring of 1878–1879 was good enough to collect for me the land-shells living on the high peaks of the Alpes Maritimes surrounding Menton, where I was unable to go myself on account of my health, and to whom also I owe the discovery of the first *Acme foliniana*, *Daudebardia isseliana*, &c., as well as of many of the spots where we afterwards together collected the interesting extinct land-shells, to describe which is my principal object in writing this paper.

To my distinguished friend Monsieur J. René Bourguignat, the well known author of numerous papers on the faunas, extinct and living, of the Quaternary Epoch, my best thanks are also due

\* Communicated by Lieut.-Col. H. H. Godwin-Austen, F.Z.S.



for the way in which he has placed his magnificent collection of European land-shells, by far the finest in existence, at my disposal for examination, and still more for the exceedingly kind way in which he has been good enough to carefully examine these Menton Mollusca, and to give me his opinion concerning their correct identification.

The land-shells of Menton belong to three distinct periods, or phases, of our Quaternary Epoch; and none of them I regard as true fossils; I would define as such only forms which existed in prior epochs.

1. *Cave period* (phases éozoïque et dizoïque, possibly both, of Bourguignat, Rev. et Mag. Zool. 1877, pp. 11-15, also Ann. Sci. Géolog. vi. p. 37).

2. *Intermediate period*, or Zone of *H. paretiana* (? phase trizoïque, Bourguignat, *l. c.*)

3. *Present period* (phase ontozoïque, Bourguignat *l. c.*).

### 1. CAVE PERIOD.

This, which I consider, without doubt, by far the oldest of the existing shell-faunas of Menton, presents many interesting features. These extinct or subfossil mollusks, which were evidently then extraordinarily abundant, prove that the climate, in that remote age, was very cold and damp, similar to that which at the present day characterizes the peaks of from 3000 to 5000 feet altitude, which form here the backbone, as it were, of the Riviera—a good number of the species being actually identical, and most of the others of more or less allied forms. Scarcely any are the same as or even allied to the species which now live along the Riviera itself. Did these land-shells live before, after, or at the same time as Prehistoric Man, the Tiger, Rhinoceros, gigantic Stag, &c., whose bones have been discovered by Monsieur Rivière and others, in such great profusion in the celebrated Menton red caves (“balzi rossi”), quite close to which these mollusks are buried? For my own part, after a long and careful study on the spot, I am quite convinced that these shells do not belong to a more recent date, and I am unable to draw any immediate conclusions as to the age of my mollusks and Mons. Rivière’s mammals &c.

The extinct shells which I found belonging to this period seem to me to be of two somewhat different ages; certainly they present considerably different aspects, as will be seen further on. The less ancient, apparently, of the two were undoubtedly contemporaneous with man, *Cervus elaphus*, &c.; the rest seem to me older, and may have lived at the same time as the more ancient inhabitants of these Caves, the Tigers, Rhinoceroses, &c.

All the localities where I found these extinct shells, with the one exception already mentioned, undoubtedly belong to one and the same age, be that what it may. They are all characterized at a glance, by the more or less red colour of the earth, containing numerous, usually rather small, stones; here and there, at the bottom

of this immense deposit, one occasionally comes across some large boulder, around and below which I found these subfossil shells, often in great profusion, sometimes incrustated in the rock itself, but generally fortunately preserved in the soft red earth which fills the crevasses of these enormous blocks of stone, in a condition as fresh and perfect as on the day they were buried.

There can, I think, be only one explanation of the really wonderful condition in which they are preserved: most undoubtedly the mollusks were at the time for the most part alive, actually living on the exact spots where they are still to be found. There they must have been suddenly buried as they lived, *in situ*, by the large deposits of this old Conglomerate, which one still finds heaped above them, of a thickness here of some 10 to 30 feet at least (oftentimes more), perhaps brought down by some enormous glacier from the high neighbouring Alps, by the St.-Louis gorge, which latter even may have been excavated as one finds it at present by this same action.

I ought to add that these subfossils are but rarely to be found on the surface itself: to discover them one has to dislodge the larger stones and excavate the soil.

Dr. J. Henry Bennet describes, in a most lucid way, this "Pleiocene conglomerate," in his interesting work 'Winter and Spring on the shores of the Mediterranean.' At page 39 he gives an account of the Geology of Menton, as also of the discovery of the bones of extinct wild beasts in these caves; he there estimates the thickness of this "conglomerate" in the neighbourhood at from 600 to 800 feet. At page 45 he speaks of the extreme probability of glacial action; but he is of the opinion of Dr. Nièpce, of Nice, that it was formed under the sea, before the Glacial period, and afterwards thrown up in its present position. The first view is doubtless correct; but the last certainly can not have been the case in the instances of which I am treating. These mollusks, interred immediately under this conglomerate, undoubtedly have never been subjected, in the most remote manner even, to the action of the sea.

I am quite of the opinion of Monsieur Bourguignat, that this conglomerate was formed very shortly after the Glacial period: the characters of these mollusks prove the climate to have been then very cold at the present sea-level; so the temperature must have been perfectly boreal on the summits of the neighbouring mountains. This would appear to be also the opinion of Prof. Issel (Appunti Paleont. Ann. Mus. Civ. Genova, vol. xiv. p. 11); he describes a similar deposit at Ventimiglia containing the bones of an extinct species of Elephant as belonging "al periodo Quaternario postglaciale."

The following deposits or beds (*A* to *D*) of this Conglomerate, without doubt of one and the same age, contain these subfossil mollusks:—

*A.* This was the only one of these deposits we could discover in France itself, all the others being in Italy: it is situated a few yards only from the frontier, a stone's throw from the "Pont St. Louis," about 50 metres above the sea, I should estimate; aspect nearly

due east; we found the shells here in the deep cutting of the high road under the larger boulders, about the level of the road, buried beneath approximately 20 feet of the Conglomerate; the mollusks were indubitably living here *in situ*.

*B.* Underneath the railway viaduct, almost exactly in front of the first cavern, something like 100 metres west of the tunnel, and about the same distance east of the Gorge St. Louis (frontier), about 20 metres above the sea. After passing through the arches, one finds before one a small amphitheatre, in which these shells can be found, here and there, in astonishing profusion. As a rule the Conglomerate here, under which they are buried, is of no great thickness, doubtless owing to the very steep incline of the slope; under one enormous rock, in especial, we collected a really wonderful number both of species and specimens. Our researches were so extensive here that we ended by dislodging the boulder itself, my friend having had a narrow escape of being crushed on the occasion.

The aspect is due south, and completely protected both from the north and east by the lofty surrounding cliffs in which the caves have been excavated at some remote period; the humidity of this spot must probably have been very considerable, owing to the small streams that doubtless trickled from the caves immediately above. The mollusks lived here also *in situ*.

*C.* Deposit, with a southern aspect, a little more to the east than the preceding and somewhat lower down, a few feet only above the sea, in a cutting of the new road which is being made along the sea-shore for working a stone-quarry, on the sea front of the tunnel. The Conglomerate, above the shells, was here about 20 to 30 feet in thickness. I am not sure that the mollusks lived on this spot.

*D.* Deposit, with a northern aspect, in a cutting of the railroad, about a quarter of an hour's walk to the east from the preceding, about a hundred yards east of the tunnel, quite cut off from all the previous localities by the peak, which here projects prominently into the sea, and which is surmounted by the tower and estate of Grimaldi, belonging to Dr. Bennet. This spot must have been very damp and cold, almost entirely shut in to the west and south by the peak, which easily explains the somewhat different "facies" of the extinct shells. Many of the species, abundant in the preceding deposits, are here very scarce, or altogether absent, whilst others, especially species of *Hyalina*, *Campylæa*, &c., are to be found in extraordinary profusion, evidently *in situ* as they lived, filling the crevasses of the larger blocks of stone, at a depth below the surface of about 15 feet. One or two of the forms also, as *Pomatias* and *Clausilia*, though closely allied, appear to be specifically distinct. We also discovered a few specimens of *Hyalina*, *Pomatias*, *Helix niciensis*, &c. a little more to the west, quite close to the perpendicular sides of the peak itself.

*E.* Bed, or deposit, near the sea and adjoining the stone-quarry, of doubtful age. The mollusks were here evidently not living *in situ*; the shells are very difficult to extract from the hard compact mass in which they are imbedded. Most of them belong to the same fauna

as the preceding; but more or less mixed up with them are others of a much more recent period, such as *Rumina decollata*, *Xerophila terveri?* (n. sp.?), &c. I was not able thoroughly to examine this locality, now much restricted by the works of the adjoining quarry; I found the work of extracting these subfossils too hard, a task which required hammer and chisel; an intelligent old man who serves as guide for the caves, however, extracted a good many for me.

*F.* Deposit, at one of the angles of the entry to the first cave, that nearest to Menton, southern aspect, and probably of somewhat less ancient age than all of the preceding. We were lucky enough to discover this narrow and very restricted deposit, containing subfossils, which we thoroughly explored, to the left as one enters within the first cave. I am consequently able to establish the fact that the (unfortunately only few) species we discovered here existed at the same time as some of the large mammals whose bones have been dug out of the interior of the cave in great quantities, and débris of which I found above, or mixed up with, these shells. We were unsuccessful in our efforts to discover any similar deposit round, or at, the other caves; possibly any one prepared to go to the expense of employing a few workmen might succeed in so doing. The earth in which they are preserved here is an ordinary-looking humus, similar to that in the interior of the cave, and without any trace of the red colour so characteristic of all the preceding. The mollusks most undoubtedly were living here *in situ*, doubtless sometimes climbing on the almost perpendicular rock in which the cave is excavated, at times hiding themselves beneath the large blocks of stone and in the crevasses at its base, where we found them. This spot, I am convinced, has not been affected by glacial action, as I take to be the case with all the preceding, which is easily explained by its being completely protected by the steep and lofty cliff immediately behind. These land-shells present a very different aspect from all the preceding, even in cases where the species appear to be identical, such as *Helix niciensis* and *Pupa quinquedentata*; several species have not been found elsewhere at Menton, *Helix ramoriniana* especially. I take all the preceding deposits to belong probably to the phase éozoïque of Bourguignat, whilst this, together with most of the mammals discovered in the caves by M. Rivière, a list of which is given by Dr. Bennet (*loc. cit.* p. 56), would fall naturally into his phase dizoïque. I am inclined to think, too, that these shells of deposit *F.* were undoubtedly contemporaneous with the well-known fossil Man, found in one of these caves. In proof of this, I may mention that, besides the débris of bones of large mammals (*Cervus elaphus* &c.), but not of any Carnivora, I found immediately associated with them certain marine shells (*Patella*, *Trochus*, and *Cyclonassa*), all of which were also found with the fossil Man, a necklace, indeed, of the *Cyclonassa* being round his neck; these débris of marine shells were probably washed out of the interior of the cave by the small streams which then, as even now, doubtless trickled down the cave. I should mention that this small deposit was virgin soil, that it had not been disturbed or affected by the explorations of M. Rivière and others within the



cave. Within the cave itself I only detected two shells in original position; they fortunately further confirm my view, as they were attached to a small ledge against one of its walls, well inside the cave, and near its present floor. The bones have been dug out by M. Rivière &c. from a depth above them of about 6 feet. One was the species of *Trochus* already mentioned as found outside, the other a fine specimen of the distinct and well-marked variety of *Pupa 5-dentata*, which I found in abundance in deposit *F*, and which I shall hereafter describe as *P. (Torquilla) 5-dentata*, var. *speluncarum*.

I will conclude by pointing out that M. Rivière himself speaks of the land-shells he came across mixed up with the large bones of extinct animals in these caves; indeed it was this remark that first led me to search for these subfossils.

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From the memoirs of M. Bourguignat ('Note compl. sur quelques Mollusques et Mammifères découverts dans une Caverne près de Vence,' 1868, and 'Revue et Mag. de Zool.' 1877, pp. 11-17), and from those of Prof. Issel ('Delle Conch. nelle Breccie &c. della Liguria occidentale,' 1867), and of Mons. Bambur ('Journ. de Conchyl.' 1868, p. 265), as also from the present researches by Mr. Coombe Williams and myself, the conchological fauna of Menton, in the early part of the Quaternary epoch, appears to have been especially characterized by numerous striking forms of *Tachea* (some of which present some of the features of *Macularia* and seem to me to form a connecting link between the two subgenera), by species of *Campylæa* and *Fruticicola* (section *Zenobia*), by numerous species of *Hyalina* (*Euhyalina* and *Ægopina*), *Clausilia* (*Delima* and *Iphigenia*, sect.), *Pupa* (*Torquilla*, *Sphyradium*, *Orcula*, and *Pagodina*), by the two forms *Cyclostoma physetum* and *C. lutetianum* (quite distinct from *C. elegans*), *Pomatias*, sp., and the largest as yet known *Acme* and a new form, allied to it, which I am about to describe as a new genus ("Renea"); lastly, by species of *Daudebardia*, *Testacella*, *Limax*, &c.

Several of the genera, or subgenera, now abounding in the district do not seem to me to have existed then—*Xerophila*, *Cochlicella*, *Euparypha*, *Leucochroa*, *Succinea*, *Rumina*, and *Ferussacia*. It is true there are great doubts as to several of them. Issel mentions having discovered a unique subfossil *Ferussacia* at Capo Zoppa; Mr. Coombe Williams also found a single specimen, subfossil in his opinion, at Menton. Personally I doubt very much that either of the specimens belong to this early period; I think, at the oldest, they belong to the zone of *H. paretiana*. The same remark applies to *Rumina*, of which I found one or two fragments in doubtful position, and which Issel also mentions in his above cited work. *Xerophila* appears considerably more doubtful, even, than either of the preceding. Bourguignat mentions a species from the cavern of Vence. I myself found numerous specimens of various new species (allied to *X. terveri*), not only immediately associated with *H. pare-*

*tiana*, but also in close proximity to most of the deposits *A* to *E*; but though fragments were very numerous all round, I could never succeed in finding a single bit even undoubtedly associated with these subfossils, which I here attribute to the "phases éozoïque et dizoïque."

## 2. INTERMEDIATE PERIOD.

Under this heading I comprise a certain number of species, characterized by the remarkable gigantic *Helix paretiana*, Issel, which can be found, here and there, all along this part of the Riviera, and which most certainly, in my opinion, are of a more recent age than the preceding; most of them are closely allied forms to those still found living in this submarine zone.

This zone of *H. paretiana* requires still further investigation, a matter of considerable difficulty, as the mollusks do not appear as yet to have been found actually *in situ*. Those I found were evidently isolated washed-down specimens, mostly in bad condition, and incrustated in the rock, from which it was often impossible to extract them. At Cape Mortela, indeed, where they occur at a considerable depth (perhaps some 40 or 50 feet below the surface), they are preserved in better condition in the comparatively soft "Couche Marneuse." Immediately above them here, in perfectly similar deposit, occurring at a depth of, approximately, 10 feet or so, can be found in profusion present-existing species, such as *H. aspersa*, *H. vermiculata*, *H. cespitum*, *Pupa multidentata*, *Rumina decollata*, *Cyclostoma elegans*, &c. The most characteristic forms I found immediately associated with *H. paretiana* were *Hyalina olivetorum* and *H. herculea*, a variety of *Rumina decollata* much stouter and larger than the existing form, one or two species of the group *Xerophila*, allied to, but quite distinct from, *X. cespitum*, which is found in profusion immediately above, and two species of the group *Tachea*, &c. I think this "Couche Marneuse" at Cape Martela clearly proves *H. paretiana* and its associated mollusks to have immediately preceded the present fauna, without any very marked break, either of change in the climate or otherwise.

## 3. PRESENT PERIOD.

This I should divide into two well-marked zones, having but very few species in common, *Pupa quinquedentata* being a marked exception—Submarine and Subalpine Zones.

A. *Submarine Zone*.—Especially characterized by species of *Xerophila*, *Macularia vermiculata*, *Leucochroa candidissima*, *Rumina decollata*, *Ferussacia* and *Cæcilianella* spp., *Clausilia solida*, &c. It is, perhaps, worthy of notice that I found the common species of *Pomatia*, *Xerophila*, &c., almost without exception, of larger dimensions than those recorded as "major" in Pfeiffer's Monogr.

B. *Subalpine Zone*.—On account of my bad health I was unable to explore the higher elevations, where many interesting forms doubtless still remain to be discovered. My friend Coombe Williams was good enough to make several expeditions to the summits of the neigh-

bouring peaks, the "Grand Mont" (4475 ft.) and the "Berceau" (3575 ft.), which were attended with very marked success. A considerable number of the subfossil species which I found in the deposits of my so-called "Cave period," have been discovered living at high elevations in the surrounding Alpes Maritimes, both by Mons. Bourguignat and now by Mr. Williams—such as *H. olivoluta*, *H. diæga*, *H. niciensis*, *Pupa obliqua*, *Hyalina maceana*, *Clausilia punctata*, *virata*, and *bizarellina*, &c.; doubtless many of the others will eventually be also discovered.

When one attains a height above the sea of approximately 1600 feet or so, *Clausilia solida* and *Rumina decollata* appear to reach their limit, and *Zonites algirus*, *H. obvoluta*, &c. appear for the first time. A little higher still occurs a fine stout variety of *H. niciensis*, *H. (Campylæa) cingulata*, var., and *H. nemoralis*; here, too, a very large, smooth and rounded variety of *H. cespitum* takes the place of the small, compressed, striate submarine variety (or distinct species?); *H. cemenlea* the place of *H. anconæ*; *Hyalina eugyrus* and *H. maceana* the place of the very distinct species of *Hyalina* abundant near the sea all along this part of the Riviera. Approaching the peaks of these Alps, one meets with various forms of *Fruticicola* (section *Zenobia*), *Pomatias patulum*, *Torquilla avenacea* and *secale*, gigantic varieties of *H. aspersa* and *H. nemoralis*, a thin, very variable, and poorly-coloured variety of *H. niciensis* closely resembling the subfossil variety from the "Balzi Rossi," *Cyclostoma physetum*, &c.

TESTACELLA WILLIAMSIANA, n. sp. (Plate XIII. fig. 1.)

*T. crassa, cretacea, subplanata, ovata, subemaciata, ad basim æqualiter anguste attenuata rotundata, supra striis incrementi concentricis valide ac subconfertim sulcata; apex exacte centralis, fere rectus, subverticalis, acute prominens; columella crassa, haud plana, perarcuata, superne conspicue intorta, inferne obsolete truncata; peristoma leviter arcuatum; superne, ad apicem terminans, lunula triangularis ac profunde incisa existat.*

Long. 5, diam.  $2\frac{3}{4}$  millim.

Of this small species I only found seven specimens, all slightly differing in size (ranging from 4 to  $5\frac{3}{4}$  millims.); Mr. Coombe Williams, after whom I have named the species, also found about six or seven, which, unfortunately, I have not been able to examine. We only found the species in Deposit B, nowhere else. It is next allied to *T. bisulcata*, Risso, admirably figured by Bourguignat in his 'Moll. Alpes-Marit. publiés par Risso,' from which it is well characterized by its peculiarly regular and attenuately compressed ovate form, by the perfectly rounded, instead of angulate, base, by the slightly though distinctly more arcuate peristome, by the more arcuate and twisted columella less distinctly truncate at base, but above all by the remarkable, almost vertical, and acutely prominent apex, perfectly central, instead of being a good deal everted, and

forming a more distinct and more triangular lunule than, I believe, in any other species of the genus; the back, too, is more regularly, closely, and deeply sulcate.

Type, Indian Museum, Calcutta; also in coll. J. R. Bourguinat and Coombe Williams.

DAUDEBARDIA ISSELIANA, n. sp. (Plate XIII. fig. 2.)

*T. umbilicata, applanata, sat fragilis, nitidissima, pallide cornea; apex paululum lateralis; anfract. 3, haud compressi, celerrime crescentes, vix convexiusculi, sutura impressa separati, ultimo valde dilatato; apertura transverse oblonga, oblique elongata (haud "rotundato-ovalis" sicut D. rufa), margine externo lente subrotundato, marginibus callo tenui junctis, columellari incrassato, subrecto, ad basim subangulato.*

Long.  $4\frac{1}{4}$ , lat.  $2\frac{9}{10}$  millim.

Compared with the three German species, *D. isseliana* is nearest *D. rufa*, from which it can be at once distinguished by its greater proportional breadth, caused by the much more rapidly increasing, slightly less convex whorls (apparent in all three, not only in the last one); the apex is less central, the texture a trifle stouter and more polished; the aperture, instead of being ovally rounded, is regularly transversely oblong, the outer margin being scarcely arcuate, instead of markedly so (that is, much more gradually rounded); and the columellar much less oblique, thicker, and altogether more prominent, more subangulate at its base. *Daud. nubigena*, Bourg., from Algeria (Moll. nouv. &c., xi. & xii. fasc. pl. iv.), is even nearer; but is a less elongately produced shell, less appressed, the aperture more rounded and not subangulate at the columella, which is more oblique and less prominent. This species appears to have been very rare: with difficulty I found, in deposit *B* only five specimens, Mr. Williams obtaining about the same number.

Type, Indian Museum, Calcutta; also in coll. J. René Bourguinat and Coombe Williams.

VITRINA (OLIGOLIMAX), n. sp.

A single specimen, from deposit *B*, was all we could find of this interesting form. I think it better under these circumstances not to describe the species; I will only mention that the narrow perforation is quite distinct.

Unique specimen in Indian Museum, Calcutta.

LIMAX AGRESTIS, Linnæus.

Not uncommon in the subaritime zone.

LIMAX, sp.

We found many hundred subfossil shells of this genus in deposits, evidently belonging to at least four or five different species; one common, fine and well-marked form measures, long. 10, lat.  $4\frac{3}{4}$ , crass. 2 millim.



## LIMAX, sp. ?

Mr. Coombe Williams found a single specimen of a small black *Limax* on the Berceau at a great elevation.

## LIMAX (KRYNICKILLUS) NICIENSIS, Bourg.

Creamy yellow, mottled with pale brown (not very closely); sole of foot and sides whitish; head and neck concolor, fulvous yellow; orifice posterior; crest rather distinct, also posterior rugosities and circular striation of buckler, mucous white.

Not uncommon near the village of Grimaldi. Mr. Williams also found it at 3000 feet on the Berceau Mountain.

## LIMAX (KRYNICKILLUS) MENTONICUS, n. sp.

Sole of foot light brown; orifice posterior; head and tentacles dull claret-colour, very sparsely speckled with black; buckler unusually long, rich brown, closely and minutely speckled with black, circular striation apparently running in two contrary directions; posteriorly nearly smooth; extreme caudal end acutely pointed, of a brighter (speckled) brown colour.

Common near Menton. This Slug is very active.

## MILAX GAGATES, Drap.

A common Menton Slug.

## MILAX CARINATA (?), Risso.

A rather uncommon species, from the Submaritime zone.

## MILAX, sp.

We found, subfossil, numerous specimens of various species of this genus in deposits.

## MILAX, n. sp. ?

Concolor, fulvous-yellow, minutely speckled with grey; sole of foot faint yellowish, undivided; tentacles inky black; buckler bilobed posteriorly; crest distinct; orifice slightly posterior; line of "limacelle" rather indistinct.

Village of Grimaldi.

## ZONITES ALGIRUS, Linnæus.

Rather local near Menton; only found at a level of 2000 feet or so, especially in the neighbourhood of the higher-level road to Nice, round the village of Roquebrune &c. I also found a single perfect specimen on the side of the road round Cape St. Martin, buried a few feet below the surface; I imagine it had been washed down from the mountains behind. I saw no trace of this species subfossil, not even in the upper stratum of Cape Mortela, where I should have expected to find it. The Menton form is more distinctly subangulate at the periphery than usual.

HYALINA (RETINELLA) HERCULÆA, Rambur (Journ. de Conchyl. 1868, Monaco, and 1869, pl. ix. fig. 7, as *Zonites* sp.).

I only found a single, fortunately very perfect, specimen of this rare, well-marked, and very distinct species: I obtained it in the lower stratum of the "Couche Marneuse" at Cape Mortela, zone of *H. paretiana*. As Mr. Bourguignat's collection, though containing most of Rambur's and Issel's Ligurian subfossil types, did not possess this interesting form, I had much pleasure in presenting him with the above unique specimen.

HYALINA (RETINELLA) OLIVETORUM, Hermann (? var. *leopoldiana*, Charp, MS.).

A nice case arises here, with regard to priority of the subgeneric name; which should it be—*Retinella*, Shut. MS., Fischer, Not. Malac. ii. 1878, or *Ægopina*, Robelt, Cont. Rossm. Icon. 1878? I have nowhere found this species living in this part of the Riviera, where its place has been apparently taken by *Zonites algirus*; in former years it evidently abounded: it occurs in deposits *A*, *B*, *C*, *E*, and by thousands in deposit *D* (the subgenus not being represented in deposit *F*). I found it also, immediately associated with *H. paretiana*, all along the coast, from Monaco to Cape Mortela, at least one other closely allied but distinct species being found with it, only of much rarer occurrence, *Hy. herculæa* of Rambur.

The largest form (true *Hy. olivetorum* fide cl. Bourg.) was especially abundant in deposit *D*; it closely resembles specimens I possess from Lucca, the dilatation of the last whorl, its slight compression at the periphery, and shape of the aperture, lunately oval, being almost exactly similar; the spire in the Menton specimens is more depressed, slightly less convex, and markedly more central; the umbilicus a trifle less perviously open.

Alt.  $15\frac{3}{4}$ , diam. 28; apert. alt.  $12\frac{1}{2}$ , lat. 13 millim. From deposit *D*.

Alt.  $17\frac{1}{4}$ , diam. 30; apert. alt.  $13\frac{1}{4}$ , lat.  $14\frac{1}{8}$  millim. Specimen from Lucca.

Var. MACROBIOTUS, nov. (? *Hyalina macrobiota*, n. sp.).

A very characteristic and distinct form, from deposits *A*, *B*, and *D*. Easily recognized from type form by the more convex whorls, the last one more abruptly deflected, more convex at base, and especially by its being notably less expanded, thus causing the spire to be markedly less central; the umbilicus is very similar; the aperture less compressed and higher in proportion, the columellar margin being less oblique. The differences can be easily seen in young as well as in mature specimens.

Alt.  $15\frac{1}{2}$ , diam.  $26\frac{1}{4}$ ; apert. alt. 12, lat. 12 millim. From deposit *D*.

Subvar. SUBINCERTA, nov.

A very curious small form, of which I found some half dozen specimens in deposits *B* and *C* only. The spire is unusually ele-

vated, quite central, the six and a half whorls moderately convex, and increasing very gradually and regularly, the last one very abruptly deflected, not dilated near its termination, as in the preceding, more convex at its base; umbilicus a good deal less open; aperture perfectly rounded, instead of laterally produced, with columellar margin nearly straight, instead of very oblique.

Alt.  $13\frac{1}{4}$ , diam.  $19\frac{3}{4}$ ; apert. alt. 10, lat. 9 millims. From deposit *C*.

HYALINA (RETINELLA) LIKES, n. sp.

*T. depressa*, superficie late ac aperte umbilicata, supra distincte subregulariterque striata; anfractus  $5\frac{1}{2}$ , vix convexi, ultimo rapide crescente, late dilatato, haud descendente, ad peripheriam subangulariter compresso, ad basim fere applanato, vix convexo; apertura paululum compressa, lunato-ovata, margine columellari reflexo, perobliquo.

Easily distinguished from all varieties of *Hy. olivetorum*, in especial by the shallow, instead of solariform, umbilicus; the last whorl also is much more narrowly compressed, flatter at base, and not deflected; the whorls are fewer, the spire much more depressed, with the sculptured striæ more distinct. Of rare occurrence in deposits *A* and *B*, abundant in *D*; unfortunately always in bad preservation, and apparently the greater number young specimens. I also found it by no means rare at Cape Vieille (? zone of *H. paretiana*).

Alt. 9, diam. (prox.) 15; apert. alt. (prox.) 7, lat. 8 millim. From deposit *A*.

Alt.  $5\frac{3}{4}$ , diam. 11 millim. Common form, ? young, from deposit *D*.

Type, Indian Museum, Calcutta; also in coll. of M. J. R. Bourguignat.

HYALINA GLABRA, Studer.

*T. spira paululum elevata*, peranguste perforata, cornea, nitidissima, supra (sub lente) delicate striatula; anfractus  $5\frac{1}{2}$ , haud convexi, ultimo rapide crescente, ad peripheriam subangulato, basi vix convexo; apertura perampla, lunato-ovata, margine externo pro ducto, gradatim rotundato, margine volumellari reflexo, subrecto.

Alt.  $7\frac{3}{4}$ , diam.  $14\frac{1}{6}$ ; apert. alt. 6, lat.  $7\frac{3}{4}$  millim.

This species was very rare in deposit *C*, did not occur at all in *A*, *B*, *E*, or *F*, but was very common in *D*, unfortunately always in bad preservation and more or less broken. It appears to vary scarcely at all as regards elevation of the spire, distinct but very narrow perforation, and the large laterally produced aperture. I did not find any recent specimens; nor is it recorded from the deposit by Risso.

Type, Indian Museum, Calcutta; also in coll. of MM. Bourguignat and Williams.

HYALINA BLONDIANA, Bourg. (Desc. Moll. Alpes-Marit. 1869, near Grasse, as *Zonites*, sp.; alt. 6, diam. 15 millim.).

Moderately abundant in the vicinity of Menton, agreeing exactly with the original description; the difference in height, recorded below, is perhaps owing to our having different methods of measure-

ment. I take mine from the base of the outer margin of aperture to the apex. It is quite specifically distinct from the following allied species, which take its place at 3000 feet or so.

Alt. 7, diam. 15; apert. alt. 6, lat.  $7\frac{1}{6}$  millim. Specimen of seven whorls, from Menton.

HYALINA EUGYRUS, Stabile (Moll. Lugano, p. 51, 1859; fide cl. Bourg.=*H. cellaria*, var. *villæ*, Stabile, Moll. Piémont, 1864, =*H. villæ*, Mortillet, not of Deshayes, Giorn. Mal. 1853).

I am indebted for this identification to M. Bourguignat. Mr. Williams found the species rather scarce on the "Berceau" and "Grand Mont," from 2500 to 4000 feet. It has six whorls of very fragile substance, spire almost flat, umbilicus very open and shallow, periphery more compressed than in the preceding, columella much more oblique, &c.

Alt.  $5\frac{1}{2}$ , diam. 13; apert. alt. 5, lat.  $6\frac{1}{2}$  millim.

HYALINA BLAUNERI, Shuttl. (Mitth. Ges. Bern, 1843, Corsica; =*Helix lucida*, Drap., var. *compressa*, Dumont & Mortillet, Moll. Savoie, 1852).

An abundant form in the subarctic zone; it does not appear to occur at any considerable altitude, at least near Menton; we found nothing like it subfossil. Young specimens bear perhaps a faint resemblance to *Hyalina fodereana*, Bourg. MS. I very much doubt if *H. blaueri* can be specifically separated from *H. lucida*; I have thought it best to do so temporarily. The present form is quite distinct from a more openly umbilicate shell from Lucca, which I received as "*H. lucida*," but which is nearer *H. blondiana*, indeed scarcely separable!

Alt.  $5\frac{3}{4}$ , diam.  $12\frac{1}{4}$ ; apert. alt.  $4\frac{3}{4}$ , lat. 6 millim. Submar. zone, Menton.

Animal entirely of a dark slate colour; sole and sides of foot of a trifle more greenish hue.

HYALINA MACEANA, Bourg. (*Zonites maceana*, Bourg. Descr. Moll. Alpes-Marit. 1869; near Grasse; alt.  $4\frac{1}{2}$ , diam. 13 millim.)

A well-marked and most distinct species, unmistakable for any other with which I am acquainted. Subfossil, it abounds at Menton, in deposits *A*, *B*, *C*, *D*; we found a single specimen in *F*. It occurs here and there along the coast as far as Monaco. Mr. Williams found it rather scarce, living on the "Grand Mont," at nearly 4000 feet.

Alt. 5, diam. 12; apert. alt.  $4\frac{1}{2}$ , lat.  $5\frac{1}{3}$  millim.

Var. PLANORBIOIDES, nov. (an potius *Hyalina planorbioides*, n. sp.?).

A singular *Planorbis*-like variety with sunken spire; the last whorl increasing more rapidly in proportion, more compressed at the periphery and (near the aperture) raised above the preceding



whorl in a very remarkable way; umbilicus narrower, &c. I only found a few specimens in deposit *D*.

Diam.  $9\frac{1}{2}$ , alt. apert.  $3\frac{3}{4}$ , alt.  $3\frac{1}{2}$  (from apex to base of aperture) millim.

Type var. Indian Mus. Calcutta; also in coll. Williams.

*HYALINA FODEREANA*, Bourg. MS.

I will not attempt to describe this species, as it is too close to many species of the group of *Hyalina lucida*, *blauneri*, &c., several of which I do not possess for comparison; I will only say that the species is everywhere abundant in deposits *A*, *B*, *C*, *D*, with the preceding, from which it is undoubtedly quite distinct. We did not find recent specimens of this form.

Alt.  $5\frac{1}{6}$ , diam.  $12\frac{1}{2}$ ; apert. alt.  $4\frac{3}{4}$ , lat. 6 millim.

M. Bourguignat informs me that I sent him some recent specimens from Menton; but they were certainly not identical with this subfossil species.

*HYALINA*, sp. ?

A small species of five whorls, apparently full-grown, of which I found some half dozen specimens in deposit *F* only. It is a little more narrowly umbilicate than young *Hyalina maceana* of the same size; the whorls increase very gradually and regularly, the last one not being dilated.

Alt.  $3\frac{1}{3}$ , diam. 7 millim.

Indian Museum, Calcutta, only.

*HYALINA MENTONICA*, n. sp. (Plate XIII. fig. 3.)

*T. parva, spira elevata, anguste perforata, subobsolete striatula, cornea, nitida; anfract. 6, convexiusculi, regulariter pergradatimque crescentes, ultimo paululum compresso, prope aperturam angusto (haud dilatato), basi convexo; apertura fere rotunda, marginibus regulariter rotundatis ac subincrassatis.*

Alt.  $3\frac{1}{8}$ , diam.  $5\frac{3}{4}$  millim.

A pretty little species, quite unlike any I know, and also unknown to M. Bourguignat. Mr. Williams found one or two recent specimens at Sainte-Agnès, about 2500 feet. It is a true *Hyalina*, and does not belong to *Vitrea*; the very narrow last whorl, not dilated at all, the narrow perforation, rounded aperture, elevated spire, &c. well characterize it. The figure is not good, and the shell has been since accidentally broken.

Type, Indian Museum, Calcutta.

*HYALINA (VITREA) TENEBRÆRIA*, Bourg. MS.

I will not attempt to describe this small form of a most difficult group, for which I have not at the moment the proper material available. It is an imperforate species, with remarkably excavated base. It was rather scarce (subfossil) in deposits *A*, *B*, and *D*. M. Bourguignat informs me he possesses recent specimens of the species from a grotto near Grasse.

**ARION HORTENSIS**, Müller.

A few specimens from just outside the town.

**ARION AUSTENIANUS**, n. sp.

I am indebted to M. Bourguignat for the information that the above is a new form. I found a few specimens near the village of Grimaldi, at about 1000 feet elevation.

**LEUCOCHROA CANDIDISSIMA**, Drap.

A small form is extremely abundant throughout the subaritime zone; specimens more or less scalariform (that is, with the whorls subdetached) are by no means rare; it is as often narrowly rimate as imperforate. I was astonished not to find the genus at all a little further eastwards at Alussio.

Alt.  $12\frac{1}{2}$ , diam.  $16\frac{1}{2}$  millim.

**HELIX (GONOSTOMA) OBVOLUTA**, Müller.

Not uncommon in deposits *A*, *B*, *C*, *D*, varying in the more or less open umbilicus. I found a single subfossil specimen at Roquebrune, zone of *Helix paretiana*; we did not find it living ourselves in the neighbourhood; but there were recent specimens in the Museum from the Turin valley (some 2000 feet). It is also recorded by Risso.

Alt.  $6\frac{3}{4}$ , diam. 14 millim. Deposit *A*. Umbilicus very open.

Alt. 6, diam.  $12\frac{1}{4}$  millim. Deposit *D*. Umbilicus less open.

**HELIX (PATULA) ABIETINA**, Bourg. (Malac. Algér. 1864).

Rare, subfossil, in deposit *B* only.

Alt.  $2\frac{1}{4}$ , diam. 6 millim.

**HELIX (PATULA) RUPESTRIS**, Drap.

Rather scarce towards the base of the Grimaldi Hill; also subfossil in deposit *F* only.

**HELIX (PATULA) PYGMÆA** (?), Drap.

Not uncommon in deposit *B*. Unfortunately I do not know the species of this group sufficiently well to be sure of my identification.

**HELIX (TACHEA ?) PARETIANA**, Issel (Att. Acad. Torino, 1867; Verezzi, alt. 32, diam. 42 mill. = *H. monaecensis*, Rambar, Journ. Conchyl. 1868 and 1869, Monaco).

Here and there we found remains of this gigantic extinct *Helix* all along this part of the Riviera; but in the "Couche marneuse" of Cape Mortela only were the specimens sufficiently well preserved to be worth keeping; and even there we only found one or two poor specimens, until my friend got some quarrymen to lower him, with a rope, some way down one of the remarkable clefts or chasms (many hundred feet often in depth) that everywhere *cut through* this "Couche marneuse." Unfortunately he took such a fancy to this fine *Helix* that he would not touch any other shell during his descent,

when he obtained more than a dozen magnificent specimens, though I was most anxious to increase my knowledge of what were the undoubted associates of this remarkable mollusk. A proper and thorough investigation of this deposit at Cape Mortela still remains for some future naturalist. It was a little too far for my now very limited powers of walking, but is not so for any one in fair ordinary health, living in the East Bay. I am convinced this species has nothing to do with the subgenus *Macularia*, with which, at first sight, it shows some affinity; I think it nearly certain it was a true *Tachea*. I could discover no trace of this species in deposits *A* to *F*.

Alt. 29, diam.  $41\frac{3}{4}$ . A common depressed form from Cape Mortela.

Alt. 34, diam. 46. Cape Mortela.

Alt.  $31\frac{1}{2}$ , diam.  $41\frac{1}{2}$ ; apert. alt. (cum perist.)  $23\frac{1}{2}$ , (sine perist.) 19, lat. (cum callos. colum. ac perist.)  $25\frac{1}{4}$ , (sine præced.) 18 millim.

This specimen, from Cape Mortela, has two broad brown bands (the lower one the broader) on the two antepenultimate whorls, four (apparently more or less interrupted) on the last whorl; the two apicals are unusually developed and prominent, horn-colour, and perfectly smooth.

#### HELIX (TACHEA?) MENTONICA, n. sp.

*Helix vermicularis*, Issel, Con. Cav. Ossif. Liguria, figs. 7, 8, 1867, not of Bonelli.

*Testa ad* "Helix vermiculariam, Bonelli," et "H. paretiaum, Issel," *affinis: imperforata, subgloboso-conoidea, vix solida, oblique irregulariter striata, ultimo anfractu valide malleato; albida, zonulis pervariis circumcincta interruptis aut continuis, sæpe perspicuoribus prope peristoma; spira plus minusve conico-elevata, apice obtuso, lævigato; anfract.  $5\frac{1}{2}$ , convexi, regulares, sutura distincta separati, ultimo majore, tumido ac rotundato, ad aperturam abrupte descendente; apertura ampla, obliqua, subovalis, marginibus callo castaneo ac valido junctis; peristoma castaneum, percrassum, expansum, intus incrassatum; margo columellaris lævis, adpressus, late reflexus.*

Diam.  $32\frac{1}{4}$ , alt.  $23\frac{1}{4}$ ; aperturæ lat. (cum peristomate ac callo columellari) 19, alt.  $17\frac{1}{2}$  millim.

Subvar. *minor*. Diam.  $29\frac{1}{2}$ , alt. 21; apert. lat. 17, alt.  $16\frac{1}{2}$  millim.

This species abounded in deposits *A*, *B*, *D* (in especial), and *E*, mostly in very bad condition, so much so that out of many hundred specimens which I obtained and carefully examined I have only obtained a few perfect specimens. It is undoubtedly the *Helix vermicularia* of Issel, typical specimens of which I examined at Genoa, but differs so much from typical Turin specimens of the true *H. vermicularia*, Bonelli, that I am unable to accept the identification.

The species varies enormously, as, I find, do most mollusks of which large series occur in a circumscribed space. It is not closely

allied to *H. nemoralis*, *H. williamsiana*, and other undoubted species of *Tachea*, but shows great affinities to *H. paretiana*, of which it might almost be described as a miniature form, while *H. ædesima* is a depressed form with peculiar aperture, more vivid coloration, and umbilicus scarcely covered with the columellar callosity, and *H. beneti* is a dwarf convex form with small aperture.

Type, Indian Museum, Calcutta; also in collection of MM. Bourguignat and Coombe Williams.

HELIX (TACHEA?) ÆDESIMA, n. sp.

*Testa ad præcedentem peraffinis, sicut H. lucasi, Deshayes, ad H. lacteam, Müller: imperforata, aut plus minusve subrimata, depresso-globosa, sat fragilis; obsolete malleata et subregulariter striata, striis delicatis obliquis; albida, zonulis variis circumcincta; spira depressa, parum elevata, ultimo anfractu paululum compresso, lente descendente, subtus ad regionem columellarem paululum excavato; apertura obliqua, transverse oblonga, superne contracta, marginibus callo brunneo junctis; peristoma vivide coloratum, superne subrecte productum, pergradatim rotundatum, ad basim abrupte angulatum, ac tuberculo subobsoleto munitum; margine columellari perobliquo, contortulo, subrugoso, locum umbilicalem callo tenui vix tegente.*

Diam.  $27\frac{1}{2}$ , alt. 9; apert. lat.  $15\frac{1}{2}$ , alt.  $13\frac{1}{2}$  millim.

Type, from deposit *F*, Indian Museum, Calcutta; also in collection J. R. Bourguignat.

Var. COLORATA, nov.

*Varietas major, sat tenuis, sæpe subrimata, vix malleata, zonulis latis ac continuis ornata.*

Diam.  $31\frac{1}{2}$ ; apert. lat.  $18\frac{1}{2}$ , alt. 16 millim.

Type var., from deposit *D*, Indian Museum; also in collection of Coombe Williams.

Var. CRASSIOR, nov.

*Varietas major, solidior, imperforata, valde malleata, ordinarie zonula unica circumcincta, apertura minus contracta, margine externo magis rotundato.*

Diam. 32, alt. 21; apert. lat. 19, alt.  $16\frac{1}{2}$  millim.

Type var. from deposit *E*, Indian Museum, Calcutta; also in collection Bourguignat and Coombe Williams.

This is a very remarkable form, bearing much the same relationship to *H. mentonica* as *H. lucasi* to *H. lactea*. It is much more depressed, with a remarkable aperture, the columella (much twisted and with a small tubercle at base) being bent inwards, so as to contract the body portion of the aperture; the external margin is straightly produced, very gradually rounded, in this differing from every other species of *Tachea* I know (*H. mentonica*, *H. williamsiana*, *H. nemoralis*, &c.), in all of which it is more or less rapidly rounded. Unfortunately, though I found a great number of spe-



cimens, I have not been able to obtain a single one in even fair condition; they crumble at a touch. The best-characterized were four specimens of a form which I found only at the entry to the cave, deposit *F*; one of these I have taken as my type. Var. *colorata*, always in bad condition, was tolerably plentiful in deposits *A* and *D*. Var. *crassior*, from deposit *E* only; I am by no means sure that this form is specifically identical with typical *H. cedesima*. The species did not occur at all in deposit *B*.

HELIX (TACHEA?) BENNETIANA, n. sp.

*Testa ad H. mentonicam affinis, sed haud difficile distinguenda; imperforata, globosa, paululum conoidea, solida; rugose irregulariterque striata, valide malleata; albida, zonulis perindistinctis circumcincta; spira parum moderate elevata, apice subacuta, laevigata; anfract.  $5\frac{1}{2}$ , convexiusculi, sutura distincta separati, ultimo majore, ad peripheriam paululum compresso, subito descendente, subtus convexo; apertura contracta, parva, subrotundata, lunato-ovata, marginibus callo brunneo junctis; peristom. castaneum incrassatum, expansum; columellaris callosa, late adpressa, subrugosa, paululum contortula.*

Diam.  $23\frac{1}{4}$ , alt. 17; apert. lat.  $14\frac{1}{2}$ ; alt.  $11\frac{3}{4}$  millim.

A still smaller form, closely allied to the preceding, easily recognized by its small aperture and convex base &c. It was only found in deposits *B*, *C*, and *E*, and was comparatively rare; the coloration, in every specimen found, was much broken up, scarcely showing traces of bands. I have named this species after Dr. J. H. Bennet, who may be called the "Discoverer of Menton," whose estate of Grimaldi, with its beautiful and well-known gardens, always thrown open to visitors, surmounts these boue-caves, and to whose kind assistance I am deeply indebted for much valued aid and sympathy in collecting my material for this paper.

Type, Indian Museum, Calcutta; also in collection MM. Bourguignat and Williams.

HELIX (TACHEA) WILLIAMSIANA, n. sp.

*Testa ad H. nemoralem, Linn., affinis; imperforata, conico-globulosa, percrassa, polita, nitida; confertim ac regulariter oblique striata, ultimo anfractu distincte malleato; albido-lactea, fere omnino late eleganterque unizonata, zonula castanea ad apicem videnda (speciminibus raris subtus duabus aliis zonulis latis circumcinctis); spira elevata, apice subacuta, laevigata; anfract.  $5\frac{1}{2}$ , convexiusculi, celeriter crescentes, sutura distincta separati, ultimo ventricosus-subrotundato, subabrupte descendente, subtus vix convexo, subapplanato; apertura subovalis, parum obliqua ac lunata, marginibus callo tenui castaneo junctis; peristom. extus ac intus vivide castaneo coloratum, supra fragile, vix incrassatum, infra expanse reflexum; columellaris sicut in *H. nemorali*, sed callo validiore locum umbilicalem tegente.*

Diam.  $30\frac{1}{2}$ , alt. 22; apert. alt. 16, lat.  $18\frac{1}{2}$  millim.

## Var. SUBNEMORALIS, nov.

*Ad H. nemoralem magis affinis; spira depressa, ultimo anfractu compresso, subtus applanato, gradatim descendente; apertura oblonga, producta, minus alta, margine externo gradatim rotundato, peristomate perlate reflexo.*

Diam.  $28\frac{1}{2}$ , alt.  $20\frac{1}{2}$ ; apert. (cum perist. ac callositate colum.) alt. 15, lat.  $17\frac{1}{2}$  millim.

Type var., Indian Museum, Calcutta.

A rather uncommon, more depressed variety, from deposit *B* only; generally ornamented with a single very vivid broad band traceable along the suture of the last two or three whorls.

I need scarcely say I have named this species after my friend Mr. T. B. Coombe Williams, whose name occurs so frequently in these pages.

## Var. SPANIAS, nov.

*Sat tenuis, globosa, depressa, vix nitida aut polita; irregulariter striata, distincte malleata; indistincte zonata, zonulis subobsoletis; spira depressa, ultimo anfractu ventricosus-rotundato, lente gradatimque descendente, subtus convexo; apertura ampla, subovalis, peristomate parum reflexo, locum umbilicalem callo tenui tegente.*

Diam.  $27\frac{1}{4}$ , alt. 19; apert. lat.  $16\frac{1}{2}$ , alt. 15 millim.

This well-marked form, with more convex base and less solid texture &c., regarded by M. Bourguignat as a distinct species, was rather uncommon; I found it only in deposits *A, B, C*.

Type var., Indian Museum, Calcutta; also in the collection of M. Bourguignat.

## HELIX (TACHEA) NEMORALIS, Lin.

Not found at all in the submarine zone, but common enough as soon as one reaches an altitude of 1500 to 2000 feet, up to the very summits of the mountains (4000 feet), where it is of very thin texture; varieties of 4 to 5 or a single band on the last whorl appear commonest. I found four or five specimens, in poor preservation unfortunately, in the "Couche marneuse" of Cape Mortela, from apparently the zone of *H. paretiana*; they are probably a variety of *H. nemoralis*, though apparently differing somewhat.

Diam.  $26\frac{1}{2}$ , alt. 21; apert. lat. 15, alt. 14 millim. From "Grand Mont," at 4000 feet.

Diam. 27, alt. 20; apert. lat. 16, alt.  $14\frac{1}{3}$  millim. From "Berceau," at 3200 feet.

Diam. 22, alt. 16; apert. lat.  $13\frac{1}{3}$ , alt.  $11\frac{1}{2}$  millim. From near Monaco.

Diam.  $24\frac{1}{3}$ , alt.  $18\frac{1}{2}$ . Subfossil, from Cape Mortela.

Measurements below from Pfeiffer, Mon. i. p. 276:—

Diam. maj. 25, min. 21, alt. 15 millim.

## HELIX (POMATIA) ASPERSA, Müller.

The variation in size, according to the altitude at which this

species is found near Menton, is interesting, as the different forms seem to be fairly constant in their several localities. On the sunny hill of Grimaldi a true dwarf form is abundant, living with a similar dwarf variety of *H. vermiculata*. Round Menton generally, and up to a considerable height, it is an ordinary form; near the summits of the mountains, at 3000–4000 feet, it is a gigantic tumid form, not very common, reminding me very much of Algerian specimens. I could see no trace of the species in the lower strata of the “Couche Marneuse” of Cape Mortela (zone of *H. paretiana*); a rather large form abounded, however, at about 5 feet or so below the surface, with other common existing shells of the country.

Subvar. *nana*. Alt.  $21\frac{1}{2}$ , diam. 25 millim. Found only on the hill of Grimaldi.

Subvar. *alticola*. Alt. 43, diam.  $46\frac{1}{2}$  millim. Summits of the neighbouring Alps, and a similar, somewhat smaller form from near the surface of the “Couche marneuse” of Cape Mortela.

*Typical form*. Alt.  $30\frac{1}{2}$ , diam. 31 millim. Abundant everywhere near Menton, up to about 2000 feet.

Measurements below, from Pfeiffer, Mon. i. p. 241:—

Diam. maj. 41, min. 32, alt. 32 millim.

*B. minor*—diam. maj. 28, min. 23, alt. 22 (spec. Azor.).

#### HELIX (POMATIA) APERTA, Born.

This is a small form, to be found here and there round Menton; by no means common.

Alt.  $21\frac{1}{2}$ , diam.  $19\frac{1}{2}$  millim. Subvar. *aritime* zone, Menton.

Subvar. *ampla*. I found one or two specimens only, near the surface of the “Couche marneuse” of Cape Mortela; like the preceding, it does not appear to exist lower down, in the zone of *H. paretiana*.

Alt.  $29\frac{1}{2}$ , diam. 26 millim.

Below I give measurements of Pfeiffer, in Mon. i. p. 25:—

Alt. 27, diam. maj. 26 millim.

#### HELIX (MACULARIA) VERMICULATA, Müller.

An ordinary form; is plentiful all round Menton up to a certain altitude, beyond which it does not appear to exist. It is also common, near the surface only, in the “Couche marneuse” of Cape Mortela.

Alt. 22, diam.  $29\frac{1}{2}$  millim.

#### Var. GRIMALDIENSIS, nov.

A remarkable dwarf form, apparently constant, as I found some hundred specimens on the hill of Grimaldi, all in the same locality. Spire varying, but usually more produced than in typical form; last whorl more rounded, scarcely subangulate, more convex at base; aperture less produced, with the columellar margin less oblique and more callous; very variable in its coloration, if any thing a trifle smoother, thicker, and more callous.

Type of var. Alt.  $17\frac{1}{2}$ , diam.  $22\frac{1}{2}$  millim; another specimen, alt. 16, diam.  $21\frac{1}{2}$  millim.

I found, near Roquebrune, a single specimen, some feet below the

surface, of a closely allied, even more characteristic form: spire produced, whorls more convex, the last one perfectly rounded, with its base quite convex; aperture as in var. *grimaldiensis*; it appears to have been less smooth.

Alt. 21, diam.  $27\frac{1}{2}$  millim.

Measurements below from Pfeiffer, Mon. i. p. 273:—

Alt. 21, diam. maj. 35, min. 27 millim.

HELIX (CAMPYLÆA) MAURELIANA, Bourg. MS. (Note compl. sur des Moll., Mammif. &c., Cav. près de Vence, 1868, p. 5, name only).

I am indebted to Mons. Bourguignat for the following Latin diagnosis:—

“*T. profunde angustequè umbilicata; depressa, subtranslucida, argute striatula, nunc surdo-albida, olim corneo-viridescenti ac zonulis tribus intensioribus (quarum duæ superiores, angustæ; tertior inferior, lata, ad regionem umbilicalem evanescent) circumcincta; spira depressa, parum convexa; apice obtusissimo, sat valido, argutissime granulato; anfractibus 6 regulariter sensimque crescentibus, supra convexis ac sutura profunda separatis; ultimo validiore, compresso-rotundato, prope aperturam leviter coarctato, ac ad insertionem labri vix descendente; apertura parum obliqua, lunata, externe rotundata, infra rectiuscula vel arcuata; peristomate acuto, patulo ac reflexo; labro supero vix reflexo; labro columellari brevissimo, circa regionem umbilicalem dilatato.*”

“Alt. 11-12, diam. max. 21-23 millim.

“Caverne Mars, près de Vence, Alpes-Marit.” (Cl. J. R. Bourguignat, *in litt.*)

Var. ROBUSTA, G. Nevill.

Fairly abundant in deposits *A*, *B*, *D*, and *E*, but very difficult to obtain any thing like perfect specimens. The Menton specimens are rather larger and of a more robust variety than the typical Vence form. In deposit *A* a subvar. *minor* was not uncommon, with more compressed whorls, less produced (almost rounded) aperture, and less open umbilicus, the columellar margin a good deal less oblique. A very characteristic feature in Menton specimens of *H. maureliana* are the often very conspicuous “varices,” especially noticeable in young specimens, as in *Nanina*, section *Bensonia* (*N. monticola*, &c.); this, of course, is due to a thickening within the peristome, at different periods of growth, only partially absorbed when the animal recommences the growth of its shell. Mons. Bourguignat writes me that its nearest ally is *H. zonata*, Studer, of which he is inclined to consider it as “une forme atavique.” It differs materially from all the varieties I know of *H. planospira*.

Var. *robusta*, from deposit *D* (figured). Alt.  $13\frac{1}{3}$ , diam.  $25\frac{1}{2}$  millim.

Subvar. *appressa*, from deposit *B*. Alt.  $12\frac{1}{2}$ , diam.  $23\frac{1}{2}$  millim.



Type in the collection of Mons. Bourguignat; types of var. and subvar. in the Indian Museum, Calcutta; also in the collections of MM. Bourguignat and Coombe Williams.

*HELIX (CAMPYLÆA) RAMORINIANA*, Issel, Conch. Cav. Ligur. occid. 1867, figs. 4-6.

An interesting rediscovery of this well-characterized and remarkable species, as yet only known from the cavern at Verezzi. I found no traces of the species about Menton, except some half dozen specimens in deposit *F*—that is to say, at the entrance of the cave. Probably the species was a strictly cavern form.

I compared the Menton specimens with Prof. Issel's types in the museum at Genoa; they are exactly similar, except that mine are a trifle larger. My largest measures diam. 22, alt.  $11\frac{1}{2}$  millim., others diam.  $19\frac{1}{2}$ , alt. 10. I ought to mention that Prof. Issel's above-quoted figures are not very successful; indeed the species is not recognizable from them.

Indian Museum, Calcutta; also in coll. Mons. Bourguignat.

*HELIX (CAMPYLÆA) CINGULATA*, Studer, var. *BIZONA*, Rossm. Icon. xi. fig. 683, from near Nice.

Mr. Williams found a single specimen at Sainte-Agnès, at a little over 2000 feet. M. Bourguignat informs me it is true *H. cingulata*, and that he found the form abundant in the Col di Tenda.

I can hardly bring myself to believe this form specifically identical with a shell sent me, as *H. cingulata*, var. *anconæ*, Gentiluomo, from Tuscany. The Menton specimen has a moderately raised spire, rather shallow umbilicus, last whorl not compressed, descending abruptly, convex at base; aperture nearly square, columellar margin scarcely oblique; both zones are somewhat obsolete, the lower one can only just be traced behind the outer lip and in front near the aperture. The above agrees exactly with Pfeiffer's measurements and characters of var. *bizona*, which besides is from the immediate neighbourhood.

Alt.  $11\frac{3}{4}$ , diam.  $21\frac{1}{4}$  millim.

Pfeiffer's measurements (Mon. i. p. 356) of var. *bizona* are—diam. maj. 24, min. 21, alt. 12 millims.

Indian Museum, Calcutta.

*HELIX (MACULARIA?) NICIENSIS*, Férussac.

This appears to have been one of the most characteristic mollusks of Menton in old days, as it is now, and to have changed very little during all the intervening period.

Mr. Williams found a few living specimens at Sainte-Agnès, at a little over 2000 feet, a fine bold form of solid texture and rich coloration. Higher up, between 3000 and 4000 feet, to the very summits of the "Berceau" and "Grand Mont," *H. niciensis* abounds. The form here approximates nearer to my subfossil var. *primitiva*; it is of thin texture, very variable as to the more or less

elevated spire; without exception, as far as I could see, imperforate, with large and produced aperture, deflected last whorl, and fairly vivid markings.

Specimen from Sainte-Agnès—alt.  $17\frac{1}{2}$ , diam.  $25\frac{1}{2}$  millim.

From the "Berceau"—alt. 15, diam.  $24\frac{1}{2}$  millim.; and another—alt.  $17\frac{1}{2}$ , diam.  $24\frac{1}{2}$  millim.

#### Subvar. COLORATA.

I did not find this species at all in the "Couche Marneuse" of Cape Mortela (zone of *H. paretiana*), though I have but little doubt it occurs. I found it, however, associated with *H. paretiana* near Monaco, and at another spot in a cutting of the railway, the single specimen from the latter locality being a most remarkable small form, the chestnut maculations being most unusually broad and close together, so much so as to amount to bands; there are three of these slightly interrupted bands on each of the last few whorls; the aperture also is less produced, the apex more prominent, and the whorls more compressed.

Alt. 14, diam.  $19\frac{1}{2}$  millim.

#### Subvar. PRIMITIVA.

Closely allied to the living form still to be found near the summits of the neighbouring Alps; imperforate, of thin texture; spire more or less raised, not nearly so depressed as in the next variety, with prominent apex; whorls moderately convex, the last one abruptly deflected, convex at base; both aperture and last whorl a trifle smaller in proportion than in the living form; the columella very similar, only moderately oblique, forming a slight angle at its termination, slightly twisted, imparting to it a subtuberculose appearance.

This was one of the commonest (and best-preserved of the large species) in deposits *A*, *B*, *C*, *E*. Curiously enough, the species did not occur at all in deposit *D*; probably this locality was not sufficiently sunny.

I have great doubts whether I have done right in separating this form, even only as a subvariety, from its close ally, living on the neighbouring mountain-tops; probably both had better be classed together as subvar. *primitiva*, characterized by the thin texture &c.

Alt. 16, diam. 22 millim.; another—alt. 17, diam.  $24\frac{1}{2}$  millim.

Types of preceding subvars., Indian Museum, Calcutta; the latter also in coll. MM. Bourguinat, Coombe Williams, and Joly.

#### Var. SPELUNCARUM, nov.

As to the necessity of separating this form there can be no two opinions; it is an exceedingly well and constantly characterized depressed variety, presenting a most distinct "facies." It was abundant in deposit *F*, and, I have reason to believe, was the principal shell found inside the cave by M. Rivière, mixed with mammal-bones &c., judging from specimens in the museum, and from an examination of the earth dug out from these caves. Markedly and in

variably more depressed, of stouter texture than the preceding, less brilliantly coloured, more often distinctly rimate than imperforate; apex acute, but less prominent; whorls distinctly less convex, the last one less expanded, less deflected at the aperture, with the periphery subangulately compressed, and base much less convex; aperture smaller in proportion, outer margin more equally rounded, the columella a good deal more oblique, with a conspicuous absence of the subangulation at its termination, and without the slight twist (or contortion) invariably found both in living specimens and in my subvar. *primitiva*; collumellar callosity less developed.

Alt.  $12\frac{1}{2}$ , diam. 20 millim.

Type var., Indian Museum, Calcutta; also in coll. MM. Bourguignat, Coombe Williams, and Joly.

Measurements from Pfeiffer (Mon. i. p. 284):—Diam. maj. 23, min. 19, alt. 12 millim.

HELIX (FRUTICICOLA) CEMENELEA, Risso.

(= *H. galloprovincialis*, Dupuy, 1848, not of Matheron, 842; = *H. cantiana* auct., nec Montagu.)

I cannot agree with Dr. Kobel and the Marquise Paulucci, who, in her excellent and most useful catalogue, unites this and the form called *H. anconæ* by Issel as var. of *H. cantiana*. I consider them quite distinct. At Menton the latter is found from the neighbourhood of the sea up to an altitude of at least 1500 feet; at 2500 feet to 4000 *H. cemelelea* takes its place, and, though varying a great deal, always preserves its distinctive "facies"! I have just been examining living typical English *H. cantiana*, Mont., and find both shell and animal quite different! I have identified both this and the following, on the strength of M. Bourguignat's information. I had previously separated them as quite distinct, taking this to be *H. rubella*, Risso, and the next to be *H. cemelelea*.

Alt.  $11\frac{3}{4}$ , diam. 18 millim. "Berceau," at 3000 feet.

Alt. 10, diam.  $14\frac{1}{2}$  millim. "Grand Mont."

HELIX (FRUTICICOLA) ANCONÆ, Issel, Append. Moll. Pisa, 1872.

A species differing still more widely from *H. cantiana*, Mont.; to me, nearer *H. carthusiana*, Müller. It appears to be a common littoral form in Liguria; I found it at Monaco, Menton, Alassio, &c. I cannot consider it identical with the preceding; even if it were to prove specifically so, it must still be regarded as a very distinct and constant variety. The animal is of a light and bright carnation-orange colour, with small and indistinct farrows, tentacles of a dull vinous shade, sole of foot yellow; seen through the shell the animal has a deep vinous appearance, mottled with yellow; axis of spire less central; whorls less elevated, more rapidly increasing, less convex; substance a good deal thicker, peristome much more coloured; umbilicus considerably less open; aperture more produced; columella more oblique &c.

Alt.  $11\frac{1}{2}$ , diam.  $16\frac{1}{2}$  millim.; another—alt. 9, diam.  $15\frac{1}{4}$  millim.

## Subvar. MINOR.

A very small form from Roquebrune: can this be the *H. delacourti*, Mabile, of Bourg., which he informs me (*in litt.*) that I sent him from Menton? He inserts the species between *H. cemenelea* and *H. anconæ*.

Alt.  $7\frac{3}{4}$ , diam.  $11\frac{3}{4}$  millim.

## HELIX (FRUTICICOLA) CILIATA, Studer.

I only found two specimens of this interesting species in deposit *B*; both agree in differing from recent Swiss specimens (received from Madame Vimart), having the aperture more laterally produced (that is, broader in proportion to its height), the last whorl more dilated, the base less convex, and the periphery slightly more distinctly keeled. Judging from M. Bourguignat's description of his *H. guevarriana*, from the neighbouring Col di Tenda, these Swiss specimens answer exactly to his description of his new species, and my Menton subfossil ones to that of his *H. ciliata*.

Alt. 5, diam. 9 millim.

## HELIX (FRUTICICOLA) CINCTELLA, Drap.

A single perfect specimen and some fragments, from deposit *B*. Both this and the preceding are recorded as living in the department by Risso.

Alt. 8, diam. 12 millim.

HELIX (FRUTICICOLA) GELIDA (?) Bourg. (Rev. et Mag. Zool. 1877, Mountain behind Briançonnet, Alpes-Marit.; alt. 7, diam. 10 millim. Also subfossil from "Cap Vieille," near Roquebrune.)

M. Bourguignat kindly identified as this species three specimens from the "Berceau" (3500 feet); they do not, however, answer well to his description, being more narrowly umbilicate than *H. moutoni*, *telonensis*, or *diæga*! I should have classed them as a sub-variety of *H. telonensis*, Mittré.

Alt. 6, diam. 10 millim.

HELIX (FRUTICICOLA) MOUTONI, Mittré, MS. (Rev. Mag. Zool. 1877, "Ascros," Alpes-Marit., &c.; alt. 6, diam. 10 millim., *fide* Bourg.).

I am indebted to M. Bourguignat for his identification as above of this form, which appears to be not rare on the "Grand Mont" and "Berceau," at 3000 to 4000 feet.

Alt.  $7\frac{3}{4}$ , diam.  $11\frac{1}{2}$  millim. "Berceau" *H. moutoni*, *fide* cl. Bourg.

Alt.  $7\frac{3}{4}$ , diam.  $12\frac{1}{2}$  millim. "Grand Mont."

## Var. SUBFOSSILIS, nov.

A single subfossil specimen, from deposit *B*, differing from every other specimen of this group that I know by its exceedingly narrow perforation; the collumella is more oblique than in the preceding.



It answers well to the description of *H. crimoda* and *H. concreta*, Bourg. *loc. cit.*, of which it may be a large variety.

Alt. 7, diam. 11 millim.

Type var., Indian Museum, Calcutta.

HELIX (FRUTICICOLA) DIÆGA, Bourg. (Rev. et Mag. Zool. 1877, Clus de St. Auban; alt. 6, diam. 11. Var. *major*, Brianconnet, Alpes-Marit.; alt.  $6\frac{1}{2}$ , diam.  $11\frac{1}{2}$  millim.).

I am indebted to M. Bourguignat for two typical specimens from the Col di Tenda; Mr. Williams found a similar, though larger, form on the "Grand Mont." I consider the species quite distinct from *H. moutoni*; but it is very close to *H. telonensis*, from which the white band at the periphery would not be sufficient ground alone for specific separation; the aperture, however, seems to me markedly larger in proportion, with less broadly reflected peristome.

Alt.  $7\frac{1}{8}$ , diam. 12 millim. "Grand Mont."

Alt. 6, diam. 10 millim. "Clus de St. Auban," ex coll. cl. Bourguignat.

HELIX (FRUTICICOLA) TELONENSIS, Mittre (*vide* Bourg., Rev. Mag. Zool. 1877; alt. 5 to  $5\frac{1}{2}$ , diam. 10 millim.).

Scarcely, I think, specifically distinct from the preceding. M. Bourguignat identified as this species several specimens (in poor condition) from the "Grand Mont," at 4000 feet; two subfossil specimens from deposit *B* are even nearer the typical Toulon form.

Alt. 6, diam.  $10\frac{1}{2}$  millim. Subfossil specimen from deposit *B*.

Alt.  $5\frac{1}{2}$ , diam.  $9\frac{1}{4}$  millim. Specimen from Toulon.

Alt.  $6\frac{1}{8}$ , diam.  $10\frac{1}{8}$  millim. Specimen from "Grand Mont."

Var. CRASSILABRIS, nov.

A single specimen, in perfect condition, from the "Grand Mont," quite distinct from all the forms mentioned by Bourguignat *loc. cit.*; chestnut-brown, with well-defined, broad, white belt at periphery; spire rather depressed, with six scarcely convex, lightly striate whorls; compressedly angulate at periphery, base evenly rounded (but not convexly swollen) round the unusually open umbilicus; aperture very small comparatively; peristome very broadly reflected; columella very oblique. Resembles *H. diæga*, with aperture of *H. telonensis*.

Alt.  $6\frac{1}{8}$ , diam. 11 millim.

Type var., Indian Museum, Calcutta.

HELIX (COCHLICELLA) ACUTA, Mller.

Rather scarce near Menton, close to the sea.

HELIX (COCHLICELLA) BARBARA, Linnus.

*Helix ventrosus*, Fr. Prod., = *H. ventricosa*, Drap.

Like the preceding, by no means common.

HELIX (EUPARYPHA) PISANA, Mller.

Rare, near the sea only.

*HELIX (XEROPHILA) CESPITUM*, Drap.

This species, also near Menton, appears to differ widely, and, at the same time, constantly, according to the altitude at which it lives; it is interesting to notice, in the "Couche marneuse" at Cape Mortela, how an allied species, with narrow umbilicus, either *Helix ferneri* or a closely connected form, abounded at a certain depth, associated with *H. paretiana*, how this species suddenly ceases at a certain distance from the surface, its place being taken by the widely umbilicate *H. cespitum*.

Var. *DISMASTHIA*, nov.

Spire very little raised, often nearly quite flat, rather solid; whorls seven, scarcely convex; last whorl compressed, scarcely descending, not tumid at base; umbilicus less open than in most forms of *H. cespitum*; aperture rather compressed, slightly produced, columellar margin very oblique; vividly coloured; above coarsely but regularly and closely striate, striæ subobsolete at base.

This form is abundant near the sea only, apparently not found at any considerable altitude, where its place is markedly taken by the next variety; I found it also at Alassio, near Genoa. A curiously coloured form, common at both places, was of a nearly uniform dark brown above, with a bright yellow belt at the periphery.

Alt.  $12\frac{1}{2}$ , diam.  $21\frac{1}{2}$  millim.; apert. alt.  $9\frac{1}{2}$ , lat.  $10\frac{3}{4}$  millim.

Var. *ALTICOLA*, nov.

Like the preceding a well-marked, characteristic, and constant variety; the two forms apparently do not, at Menton at least, run into one another; the two almost seem to me specifically separable; some conchologists will doubtless consider them so; the anatomist will have to settle the question. At an altitude of 2000 feet for certain (perhaps sooner), var. *alticola* takes the place of var. *dismasthia* and is found in great abundance up to the very summits of the mountains, over 4000 feet.

Spire moderately raised, almost smooth; the upper whorls sub-obsolete striate, openly and solariformly umbilicate, texture a good deal thinner than in the preceding var.; whorls seven, convex, last whorl globosely rounded, tumid at base; aperture nearly perfectly round, the interior as high as broad, outer margin descending more abruptly, the columellar one markedly less oblique, the peristome less thickened within; coloration, above especially, less vivid.

Alt. 18, diam.  $27\frac{1}{2}$ ; apert. alt.  $13\frac{1}{4}$ , lat. (cum marg.) 14 millim.

For comparison with the two preceding measurements, I give below those of *H. cespitum* and its var. *major* as recorded by Pfeiffer (Mon. i. p. 161).

Diam. maj. 20, alt. 11 millim.

Var. *major*—diam. maj. 25, alt. 14 millim.

Types of the two preceding varieties in Indian Museum, Calcutta.

*HELIX (XEROPHILA) SUBCESPITUM*, n. sp.

I found a few subfossil specimens of this undoubtedly distinct

new species, immediately above the spot I call deposit *B*; but in no case could I find a specimen undoubtedly associated with the species of this deposit; it may be that they are of the same age, only that they were not living immediately mixed up with these other mollusks. After a long and tedious investigation I have come (though somewhat doubtfully) to the opposite opinion; I believe they are of a more recent age, and have been buried through some altogether different cause. I purpose giving a full description and figure at some future time, as I wish to compare the species of this group with my Spanish, Algerian, and Corsican specimens, which are not at the moment available.

Alt. 10, diam.  $18\frac{1}{4}$  millim.

Type, Indian Museum, Calcutta.

*HELIX (XEROPHILA) TERVERI* (?), Michaud.

I think there is little doubt this is the species living specimens of which, from Toulon, were described and figured under the above name by M. Rambur (*Journ. Conchyl.* 1869). It does not exist now at Menton, where varieties of *H. cespitum* have taken its place; I found it, however, subfossil and by no means uncommon near Roquebrune station, near deposits *B* and *D*, and in the lower stratum at Cape Mortela, immediately associated with *H. pare-tiana*.

Alt.  $11\frac{3}{4}$ , diam. 19 millim.

Var. *SUBARENARUM*, nov.

A larger and more globose form, very likely specifically distinct, of which I found a few specimens only, subfossil.

Alt. 14, diam.  $21\frac{1}{2}$  millim.

Both the preceding forms, Indian Museum, Calcutta.

*HELIX (XEROPHILA) SCLERA*, n. sp.

*T. ad H. cespitum et H. Terveri affinis: conico-elevata, peranguste profundeque umbilicata, solida; alba (aut cretacea), zonulis variis circumscripta, apice corneo ac notabiliter acuto; anfract. 7, convexiusculi, sutura perimpressa separati, ultimo majore, rotundato, basi convexo, prope aperturam celeriter descendente ac vix dilatato; apertura haud producta, fere rotundata, margine externo convexo; superne regulariter confertim striata, striis obliquis, subflexuosis et planiusculis.*

Alt.  $13\frac{1}{2}$ , diam. 19 millim.

Another very distinct species of the same group; the least openly umbilicate, with the most subconvexly raised spire and the most prominently acute apex of any I know; the rapidly descending, scarcely dilated and rounded last whorl, as also the more distinct, subflexuous sculpture are also apparently constant characters; it only occurred, subfossil, imbedded in hard and solid rock, in the upper surface of deposit *E*, evidently associated with *Stenogyra decollata*.

Type, Indian Museum, Calcutta.

*HELIX (XEROPHILA) LINEATA*, Olivi (= *H. maritima*, Drap., alt. 8, diam. maj. 11, min.  $9\frac{1}{2}$  millim.).

Exceedingly abundant in the subarctic zone near Menton; it also occurred at Alassio. I found many curious varieties and deformities; the commonest forms are uniform brown, or white with a broad brown band, both plentiful in all sizes.

Subvar. *major*. Alt.  $11\frac{1}{2}$ , diam. 15; another—alt.  $10\frac{1}{2}$ , diam.  $13\frac{1}{4}$  millim.

Subvar. *minor*. Alt. 8, diam. 9 (a beautiful and rare form); another—alt.  $6\frac{1}{2}$ , diam. 9 millim.

*HELIX (XEROPHILA) VARIABILIS*, Drap. (alt. 12, diam. maj. 19, min. 17, ex Pfeiffer, Mon. i. p. 157).

I only found this species at Cape Vieille, between Roquebrune and Monaco, where it appeared to be rather localized.

*HELIX (XEROPHILA) PSEUDENHALIA*, Bourg. (Mal. Château d'If, pl. i. figs. 17–21, 1860; alt. 8–9, diam. 10–11 millim.).

M. Bourguignat regards this species as not belonging to the group of *H. maritima*. I confess it seems to me scarcely separable, even specifically. Menton specimens are subkeeled at the periphery.

Alt.  $7\frac{3}{4}$ , diam.  $10\frac{3}{4}$  millim.

*HELIX (XEROPHILA) NEGLECTA*, Drap. (alt. 7, diam. maj. 14, min. 12 millim., ex Pfeiffer, Mon. i. p. 164).

Very local at Menton, confined, as far as I know, to the neighbourhood of Roquebrune station.

Alt.  $7\frac{1}{2}$ , diam.  $12\frac{1}{4}$  millim.

*HELIX (XEROPHILA) PALADILHI*, Bourg. (Moll. Nouv. &c. 1866, pl. xxx. figs. 1–5, Montpellier; alt. 4, diam. 7 millim.).

I include this species, as Mr. Bourguignat informs me I sent him a single specimen mixed up with *H. candidula* from Menton. Mr. Williams found a single specimen of a closely allied species at over 3000 feet on the "Grand Mont," which I am unable to identify; it can scarcely be an extreme var. of this species. At Alassio, however, I found two specimens of a very distinct little form, which agree exactly with the original figure of this species.

Alt.  $4\frac{1}{6}$ , diam. 7 millim. Specimen from Alassio.

Alt.  $5\frac{1}{4}$ , diam.  $8\frac{1}{4}$  millim. From the "Grand Mont;" specific identification very doubtful.

*HELIX (XEROPHILA) TERRESTRIS*, Chemnitz (alt.  $6\frac{1}{2}$ , diam. maj. 10, min. 9, ex Pfeiffer, Mon. i. p. 179).

Extremely abundant at Menton, where I found many curious forms, some much distorted. M. Bourguignat writes me that I sent him one very curious abnormal specimen, "having the ordinary



upper whorls and then, owing to some injury, the lower whorl of a *H. pyramidata*."

Alt.  $5\frac{3}{4}$ , diam.  $11\frac{3}{4}$ ; another—alt. 7, diam. 9 millim.

**HELIX (XEROPHILA) PYRAMIDATA**, Drap. (alt.  $7\frac{1}{2}$ , diam. maj. 11, min. 10 millim., ex Pfeiffer, Mon. i. p. 160).

Also common near Menton. I found neither this, the next, nor the preceding species at Alassio. One specimen which I found is almost discoidal.

Subvar. *major*. Alt. 9, diam. 12 millim.

Subvar. *minor*. Alt.  $5\frac{1}{4}$ , diam.  $7\frac{1}{4}$  millim.

**HELIX (XEROPHILA) UNIFASCIATA**, Poiret (Prodr. 1801, = *H. candidula*, Studer, 1820; alt. 5, diam. 8–9 millim., ex Pfeiffer, Mon. i. p. 168).

Very common, varying much in size. A rare subvariety occurred on Grimaldi Hill, dark brown above and the outer half of the base, with a narrow, well-defined, light-yellow belt at the periphery, just traceable along the suture, the central portion of the base straw-colour, last whorl more compressedly subangulate.

Subvar. *major*. Alt. 6, diam. 10 millim.

Subvar. *minor*. Alt.  $3\frac{1}{2}$ , diam.  $5\frac{3}{4}$  millim.

Subvar. *luteofasciata*. Alt. 4, diam.  $6\frac{1}{2}$  millim.

**HELIX (XEROPHILA) CONSPURCATA**, Drap. (alt.  $3\frac{1}{3}$ , diam. maj. 6, min. 5 millim., ex Pfeiffer, Mon. i. p. 171).

Very common all along this part of the Riviera, as far (at least) as Alassio.

Alt. 4, diam. (vix)  $6\frac{1}{2}$  millim.

Var. **ILLUVINOSA**, nov.

(An potius *H. illuviosa*, n. sp.?)

An apparently constant form, differing conspicuously in the character of the epidermis and slightly in those of the shell itself. The form not being known to M. Bourguignat, I should not have hesitated to describe it as new, but that I found so few specimens, only two or three mature and a few young ones; they all came from a damp shady ravine halfway up the hill, immediately behind the Hotel des Anglais.

**BULIMINUS (CHONDRULA) QUADRIDENS**, Müller.

Var. **PROLIXA**, Pini (Nuove spec. &c. Moll. 1879).

I am indebted to M. Bourguignat for the information that this very common Menton shell is the var. *prolixa* of Pini; it is very abundant and variable from the sea-level up to some 2000 feet; it is also found near the summits of the "Berceau" &c., but is there a rare shell; it did not occur at all subfossil. All the numerous varieties have the aperture distinctly quadridentate, there being amongst them no apparent transition to the next species, which we did not find at all recent.

Long.  $11\frac{1}{4}$ , diam.  $4\frac{1}{4}$  millim. An elongate, more or less compressed form, not uncommon in the submarine zone.

Long. 13, diam.  $4\frac{1}{2}$  millim. The ordinary Menton form.

Long.  $9\frac{1}{2}$ , diam.  $3\frac{3}{4}$  millim. A small and rather convex form, rather scarce here.

#### BULIMINUS (CHONDRULA) NISO, Risso.

Apparently very scarce; I found five or six subfossil specimens only in deposit *B*; they agree in being a small, more or less sub-convex form, with the columellar dentition quite different from that of the preceding.

Long. 10, diam.  $3\frac{1}{2}$  millim.

Indian Museum, Calcutta.

#### PUPA (PUPILLA) MUSCORUM, Linnæus.

A few specimens from deposit *F* only, all of them possessing a parietal tooth. The species did not occur recent at Menton; but I found very similar specimens to the above subfossil ones at Alassio.

Long.  $3\frac{1}{2}$  millim.

#### PUPA (PUPILLA) UMBILICATA, Drap.

We did not ourselves find this species at Menton; but I saw specimens in the small museum, found just outside the town. I found a curious variety of it at Alassio.

#### PUPA (VERTIGO) MINUTISSIMA, Hartm.

I found only two broken specimens in deposit *B*; the whorls were very convex and tumid, no parietal fold (or tooth); I think, only 5 whorls.

Var. (? sp. distinct.).

Three broken specimens from deposit *B*, differing conspicuously from the preceding; six whorls, much less convex and tumid, giving the form an attenuate appearance; the aperture has a strongly developed parietal fold; the striation seems more oblique.

Both of the above (subfossil forms) in Indian Mus. Calcutta.

#### PUPA ? (TORQUILLA ?) PSAROLENA, Bourg.

Originally described as *Bulimus*, sp. Rossmässler, Ic. vol. iii. 1854, fig. 929, who figures the species as *Bulimus cinereus*, Mortillet, Cat. Coq. Nice, 1851, between the Col di Tenda and Nice (that is, just behind Menton), notices its affinity to species of *Torquilla*, and hesitates in which genus it should be classed. When I found my single very perfect specimen in deposit *B*, I felt no doubt of its being an edentulate species of *Torquilla*, and have not altered my opinion since M. Bourguignat gave me some typical living specimens. My subfossil specimen differs not a little from the latter, resembling still more strongly species of *Torquilla*; whorls distinctly 7, more elongately, regularly produced, the last one not so convexly tumid; in proportion the aperture a little shorter and less

everted, with less oblique columella ; it is, however, too close to be separated, even as a variety.

Unique (subfossil) specimen in Indian Museum, Calcutta.

PUPA (TORQUILLA) QUINQUEDENTATA, Born.

Living specimens are most abundant all along the Genoese Riviera, at Monaco, Menton, Alassio, &c. At Menton it is found from the sea up to 2500 feet ; after that it becomes much rarer, but exists up to nearly 4000 feet. There is but little difference between the sub-maritime form and that from the higher regions ; the latter are generally somewhat smaller.

Long.  $14\frac{1}{3}$ , diam. 4 millim. A fine form from Roquebrune station.

Long.  $14\frac{1}{4}$ , diam.  $3\frac{1}{6}$  millim. A rare and remarkably attenuate var., of 11 whorls, from St. Agnès (2500 feet).

Long.  $9\frac{1}{6}$ , diam.  $3\frac{1}{3}$  millim. A common dwarf form from the same spot.

Long.  $13\frac{1}{4}$ , diam.  $3\frac{3}{4}$  millim. A common cylindrical form from the "Berceau."

Var. PRÆHISTORICA, nov.

The commonest subfossil shell in all the deposits except *F* ; though varying in countless ways, it always preserves a distinct "facies" from that of the preceding living form ; it can invariably be distinguished by the much stronger and more regular striation, not so oblique, so flexuous, or so inclined to be subobsolete ; the aperture is also invariably smaller and more contracted, less everted as a rule, with both margins straight and parallel, instead of more or less rounded ; the folds appear scarcely to differ at all.

Long. 14, diam. 4 millim. Type of the var. from deposit *B*.

Var. SPELUNCARUM, nov.

A more distinct and characteristic variety than the preceding, which I only found in deposit *F*, where it was abundant, and in the interior of the cave itself (as I have already mentioned). A very short, convexly swollen, tumid form, of only 9 instead of 10 whorls, the last being proportionally much broader ; striation more like that of the typical form than of the preceding variety ; the short, quadrangular, unusually everted aperture, with remarkably thickened and reflected peristome, seems to be its most characteristic feature, the margins being more convexly rounded and united by a distinct (instead of subobsolete) callosity ; I can see no difference in the folds (or teeth).

Long.  $10\frac{1}{2}$ , diam.  $3\frac{1}{2}$  millim. From deposit *F*.

Types of all the preceding in Indian Museum, Calcutta.

PUPA (TORQUILLA) MULTIDENTATA, Olivi.

= *P. variabilis*, Drap.

Though more localized than the preceding, a very common Menton mollusk, varying enormously in the number and shape of the whorls

&c., with a marked tendency (here at least) to produce abnormal and remarkable forms: it also ranges from the sea to a considerable altitude, though I do not think Mr. Williams found it above 2800 feet. I found what I consider the typical form, small and moderately convex, here and there near the sea, rather scarce, not in company with the following variety; we also procured somewhat similar specimens from St. Agnès (2500 feet). It did not occur at Alassio.

Long.  $10\frac{1}{2}$ , diam.  $3\frac{1}{4}$  millim. A constant form, Menton (11 whorls).

Long.  $13\frac{1}{4}$ , diam.  $3\frac{3}{4}$  millim. From St. Agnès (12 whorls).

Var. *POLITA*, Risso.

The finest and most remarkably turriculately produced specimens of this variety which M. Bourguignat had ever seen were some I found on the Hill of Grimaldi, where, though localized, it abounded; I found a similar form in the upper stratum of Cape Mortela.

Long. 19, diam.  $4\frac{1}{2}$  millim. An extreme turriculate form, of 15 whorls, from Grimaldi.

Long. 15, diam. 4 millim. An ordinary form, village of Roquebrune (1500 feet).

PUPA (*TORQUILLA*) *OBLIQUA*, n. sp. (Plate XIII. fig. 4.)

*T. ad P. multidentatam affinis, sed forma minor, compressior, magis cylindrica et turriciformis; anfr. 11, fere æquales, sutura magis impressa separati; apertura percontracta, quadrangularis, marginibus subrectis, parallelis ac callositate pervalida junctis; margine columellari inferne distincte angulato (in P. multidentata subrotundato); plica parietalis minus obliqua et prominens, plica columellares magis profundæ, plica palatalis principalis conspicua et notabilis, recte ascendens, haud arcuatim incurvata.*

A rather rare species, from deposits *B* and *F* only; M. Bourguignat informs me he possesses numerous recent specimens from the "Plateau glacé de Méaille, Dépt. Basses-Alpes." I had hoped he would have honoured me with a Latin diagnosis, as in two other instances, in which case I should gladly have attached his name to this species; I do not think it right to do so without such diagnosis, for fear of introducing doubt as to what is really the type of the species. I should have ranked this subfossil form as a remarkable dwarf variety of *P. multidentata*, but for the constant and characteristic difference in the prominent palatal fold, which is always more or less semicircularly and markedly curved or rounded in all the forms I know of *P. multidentata*; in my new species this fold ascends the aperture without any deflection or curve whatever; the parietal fold is also distinctly straighter and less prominently produced; the columellar margin not being in the least convex, as well as distinctly angulate at base, seems also a constant character. The present form is nearer the wonderfully produced and turriculate var. *polita* of Risso than typical *P. multidentata*.

Long. 10, diam. 3 millim. Type from deposit *F*.

Long.  $9\frac{1}{2}$ , diam.  $3\frac{1}{10}$  millim. Specimen from deposit *B*.



Type, Indian Museum, Calcutta ; also in coll. MM. Bourguignat and Williams.

PUPA (TORQUILLA) SECALE, Drap.

Recent specimens were abundant near the summit of the "Grand Mont," at 4000 feet.

Long.  $6\frac{3}{4}$ , diam.  $2\frac{3}{4}$  millim.

In coll. Indian Museum, J. R. Bourguignat, and Coombe Williams.

PUPA (TORQUILLA) AVENACEA, Brug.

Living abundantly, with the preceding, at 4000 feet ; we also found it, but rather scarce, in deposits *B*, *C*, and *F*.

Long. 7, diam.  $2\frac{1}{2}$  millim. From the "Grand Mont."

Long.  $7\frac{3}{4}$ , diam.  $2\frac{1}{2}$  ; another, long. 5, diam. 2 millim. Deposit *B*.

PUPA (TORQUILLA?) GRANA, Drap.

A very common form everywhere in the Submaritime zone ; it did not occur subfossil or at higher elevations. I much doubt if this species is a true *Torquilla* ; I believe the animal will prove to be of a different type ?

Var.

A rather scarce form, living in shady and damp localities ; it may possibly be a distinct species, perhaps the *P. micheli*, with which I am not acquainted.

PUPA (ORCULA) DOLIOLUM, Brug.

Rare, at a single spot in deposit *B* : this is the first record of this species in the Alpes-Maritimes, it is not mentioned in Risso's work.

In coll. Indian Museum, Calcutta, J. R. Bourguignat, and Coombe Williams.

PUPA (SPHYRADIUM) BOURGUIGNATIANA, n. sp. (Plate XIII. fig. 5.) Specimen figured has since been accidentally broken.

*T. aperte perforata, cylindrica, regulariter turriformis, apice obtuso, lævigata, nitida ; anfract. 10, vix convexiusculi, fere æquales, sutura impressa separati, ultimo brevi, inferne paululum compresso ; sub lente obsolete striatula, striis paululum obliquis, regularibus ; apertura angusta, triangulariformis, superne dilatata, inferne attenuate compressa, plicis 4 minutis ; plica parietali validissima, paululum obliqua, plica columellari prominente, subrecte transversa, 2 palatalibus haud conspicuis ; peristom. expansum, incrassatum, marginibus callo crasso junctis, margine dextro supra medium dente valido munito, margine columellari supra medium abrupte deflexo.*

Long.  $5\frac{1}{6}$ , diam. (vix)  $1\frac{1}{2}$  millim.

Subvar. OBESA, nov.

*Anfract.  $8\frac{1}{2}$ , paululum magis convexiusculi et magis celeriter cre-*

*scentes, ultimo longiore, basi vix compresso; apertura amplior, inferne minus contracta, margine columellari rectiore.*

Long. 5, diam.  $1\frac{5}{8}$  millim.

Type, Indian Museum, Calcutta; also in coll. MM. Bourguignat, Coombe Williams, P. Joly, P. Fagot, and Colonel Godwin-Austen.

This was exceedingly abundant in deposits *A, B, C*; I found a single specimen in deposit *F*, of a short thickset variety (var. *tumida*), probably enough a distinct species. Typical *Pupa biplacata*, Mich., and *P. ressmanni*, Villa, are the nearest forms I know to *P. bourguignatiana*; from both the present species can be told at once by the above-described characters of the aperture. A specimen from Tuscany, which I obtained from Madame Vimont at Paris, labelled *P. biplacata*, is a totally distinct species from the Menton one; it is the *P. toscanica* of Bourg.

Var. **PLAGIOSTOMA**, NOV. (Plate XIII. fig. 6.)

(An potius *Pupa plagiostoma*, n. sp.?)

This is a well-marked and very distinct form, distinguishable at a glance by the characters of the aperture, which appear to be constant; it was by no means rare in deposits *B* and *C*.

Spire slightly convex, less gradually tapering (or turreted); whorls  $8\frac{1}{2}$ , the first  $3\frac{1}{2}$ , increasing rapidly, the others of almost equal breadth, the last one longer in proportion, more compressed at its base, so much so that it has a subcarinate appearance round the umbilicus; striation a little more distinct and more oblique; aperture quite differently shaped, not triangular, but more compressed, narrowly oblong, as broad at its base as above; both columellar and parietal folds more twisted, the former less straightly transverse; the two palatal ones, seen through from the back, appear more callous and to run into one another, in the type form they appear to run more or less parallel; the peristome even more callously thickened, with its margins joined by a more developed callosity; the columellar margin has a very slight bend at its commencement, otherwise it is quite straightly oblique, without the characteristic deflection of *P. bourguignatiana*; the callous tubercular tooth on the outer margin equally prominently and robustly developed; this tooth appears to be peculiar in the group to the Menton species, in which it exists in every specimen and in all the varieties, the other species merely possessing a slight thickening in its place, as far as I know.

Long.  $4\frac{1}{2}$ , diam.  $1\frac{1}{4}$  millim.

Subvar. **ANGUSTA**, NOV.

This is a by no means rare form, which has decided me on not specifically separating the preceding; it has a similar aperture, as also a coarser striation, but possesses 10 whorls, the first eight of which are even more cylindrical than in the type form, and more compressed, the last two being in proportion stouter and more convex, imparting to the spire a remarkable emaciated appearance.

Types of the variety and subvariety are in the Indian Museum, Calcutta; also in collections of MM. Bourguignat and Coombe Williams.

Var. PRÆCLARA, nov. (Plate XIII. fig. 7.)

(An potiùs *P. præclara*, n. sp.?)

This I for some time considered a distinct species; at any rate it is a well-marked constant variety. It was not rare, in deposit B only, and often in such perfect preservation that it looked as if the animal had only just been extracted.

Spire slightly convex, much like that of var. *plagiostoma*, but more pupiform—that is, more tumidly swollen, not so attenuately contracted; whorls 8 to 9, the last two proportionally more swollen and convex, the last not compressed at its base (in this unlike all the preceding); very translucent, so much that the columella can be traced sometimes nearly to the apex, smooth, shining, no trace of the oblique sculpture characteristic of the preceding; the aperture is not unlike that of var. *plagiostoma*, though less contracted, equally oblong, as broad below as above—that is, with the margins parallel; the parietal fold considerably less vertical than in the type form; the columellar one similarly straightly transverse; the palatal ones, as seen through the back of the last whorl, seem to me much the same; the outer margin is less straight than in any of the preceding forms—that is to say, is more pinched-in at the callous tooth, and is consequently more arcuate above and below; the columellar one considerably less oblique, above scarcely twisted, at base more gradually rounded.

Long.  $4\frac{1}{2}$ , diam. (yix)  $1\frac{1}{2}$  millim.

Type var., Indian Museum, Calcutta; also in coll. Bourguignat and Coombe Williams.

Var. GRIMALDIENSIS, nov.

(An potiùs *P. grimaldiensis*, sp. nov.?)

This form, I believe, will eventually prove to be distinct from its allies found on the other side of the headland, as is the case with species of *Clausilia* and *Pomatias*; as, however, I only found, in deposit D, a single specimen (the preceding forms not being found there at all), I do not feel justified, at present, in describing it as a distinct species.

A short, tumid, pupiform variety, with only 7 whorls, more convex and increasing more rapidly than in any of the preceding, the last one perfectly rounded at base; the aperture much shorter and less contracted, with much less conspicuous folds, which are further within; the columellar margin more broadly reflected, but less callous, without any twist or deflection whatever, scarcely oblique, almost rounded at base; outer margin with its well-developed tooth, as in the type form.

Long. 4, diam.  $1\frac{5}{8}$  millim.

Unique type var., Indian Museum, Calcutta.

PUPA (SPHYRADIUM) JOLYANA, n. sp. (Plate XIII. fig. 8.)

*Testa profunde et late umbilicata, regulariter cylindrico-ovata, obtusa, sericina, cornea; confertim plus minusve oblique costulata,*

*costulis haud acutis, subplaniusculis; anfract. 8, regulares, vix convexiusculi, ultimo majore, basi compresso, circa regionem umbilici acute carinato; apertura recta, angustissima, quadriplicata; plicis parietali forti, conspicua, contorta, vix obliqua, plica columellari profunda, valida, transversa, plicis palatalibus remotis, haud conspicuis; peristom. album, continuum, solutum, perlate ac crasse reflexum, margine superiore valde intorto, cum margine externo angulum acutissimum formante; margine externo fere recto, supra medium dente pervalido munito, margine columellari recto.*

A very rare and curious form, with wonderfully contracted aperture, of which I could only find four specimens in deposit *B*. I have much pleasure in naming the species after my friend M. P. Joly, of Algiers. The only other known species of this section of *Pupa* (*Sphyradium*) is *P. ferraria*, Porro, a shell which, however, differs totally in its more obtusely conical spire, swollen above; in the Menton species the ovately cylindrical whorls increase regularly, the last one being the broadest; the umbilicus is deeper, and the carination round it more acute; the sculpture, instead of being subregularly oblique throughout, is decidedly less oblique (nearly straight) on the last whorl than on the preceding ones, flexuous, and a trifle more crowded; the aperture is markedly narrower, more everted, and more detached, with the peristome more thickly reflected and its upper margin peculiarly twisted, forming a very acute angle with the outer margin, which is straighter and provided with a much stronger tooth, reaching the centre of the aperture; both parietal and columellar folds more developed, the former more upright, more twisted, the latter buried so far back as to be seen with difficulty.

Long. 4, diam.  $1\frac{1}{2}$  millim.

Type, Indian Museum, Calcutta; also in collection of M. Bourguignat.

PUPA (*SPHYRADIUM*) AUSTENIANA, n. sp. (Plate XIII. fig. 9.)

*Testa aperte, minime profunde, et late umbilicata, conico-ovata, obtusa, fulvo-cornea; eleganter oblique costulata, costulis filiformibus, acutis, perdistinctis, subdistantibus; apex obtusa, levigata, cornea; anfr. 8, prioribus 4 regulariter crescentibus, convexiusculis, 5<sup>to</sup>, 6<sup>to</sup> et 7<sup>mo</sup> regularibus, perconvexis, turgidis, ultimo perirregulari, multum minore ac minus convexo, in medio linea impressa striato, infra subito minore, valde ascendente; apertura ascendens, perversa, triangularis, basi rotundata, marginibus callo forte junctis; margine externo late reflexo, supra medium valide impresso, intus paululum incrassato, margine columellari simplici, reflexo ac per-obliquo.*

This very curious form, named after my friend Colonel Godwin-Austen, belongs to the section *Pagodina* of Stabile (Moll. Piémont, p. 100, 1864, type *P. pagodula*, Desmouliens); it was by no means rare, though evidently very local, in deposits *A* and *B* only. The umbilicus is broadly and widely open, but is at the same time very shallow; the two obtuse apical whorls are smooth; the next two



are moderately convex, short, regular, increase rapidly in breadth, the upper one closely costulated, the ribs scarcely oblique; the lower one has these ribs more distant, less crowded and more acutely raised; the next two, of about equal height and breadth, also increase rapidly in breadth, are very convex, the ribs become still a little more acute, more oblique and less crowded; the antepenultimate has similar ribbing, is much the same in size, only a trifle more tumidly convex, it has the peculiar character that whilst on the side of the aperture it only just equals the preceding one in width, on the other side it markedly surpasses it: the last becomes abruptly much narrower above, about equal in width to the fourth whorl; on its centre it is girt with an impressed line, dividing it into two nearly equal portions, the lower of which becomes abruptly narrower and more compressed, and is brought round (or ascends) in such a manner as to peculiarly evert the aperture, and to bring the latter's outer margin right up to the suture, reminding one of the genera *Boysia*, *Scopelophila*, &c.; looking at it from behind the aperture, it ascends so much that, at its termination, it completely hides the antepenultimate whorl. The aperture is much everted, triangular, somewhat contracted by the strong inflection of the outer margin above the middle, caused by the impressed dividing groove of the last whorl.

Long.  $3\frac{1}{8}$ , diam. 2 millim.

Type, Indian Museum, Calcutta; also in coll. MM. Bourguignat, Williams, Fagot, Joly, and Godwin-Austen.

#### CLAUSILIA (DELIMA) PUNCTATA, Michaud.

A rather uncommon and almost invariably broken subfossil form from deposits *A*, *B*, *C*, *D*.

M. Bourguignat found it living in the Col di Tenda.

CLAUSILIA (DELIMA) VIRIATA, Bourg. (Hist. Claus. France, 1877, from the Col di Tenda.)

Though almost exactly of the same proportions as the preceding, a totally distinct species, it is quite impossible to confuse the two. This form occurred subfossil, with the preceding, in deposits *A*, *B*, and *C*; they are still to be found living together in the Col di Tenda.

#### CLAUSILIA (PAPILLIFERA) SOLIDA, Drap.

An abundant species from the immediate proximity of the sea up to some 2000 ft.; at the higher elevations on the "Grand Mout," &c. *Cl. solida* does not exist, indeed Mr. Williams could not find there any representative of the genus, although he searched specially for them. The numerous varieties of this form are some of them very interesting; and the whole group requires special study. I think there can be no doubt M. Bourguignat was right in specifically separating one or two of them. Unfortunately it is quite impossible to identify these closely allied forms without first-rate figures. I noticed that the variety living near the sea had a much darker animal than the form I found high up at the village of Roquebrune.

CLAUSILIA (IPHIGENIA ?) BIZARELLINA, Bourg. Hist. Clausil. France, 1877.

I am indebted to M. Bourguignat for the above identification. Specimens of this group abounded in countless curious varieties (? species) in all the deposits *A*, *B*, *C*, *D*, *E*, and *F*. We did not find any living forms of this subgenus ourselves; but numerous species have been described from the higher elevations in the neighbourhood by Risso and Bourguignat.

CLAUSILIA (IPHIGENIA ?), sp.

A certainly distinct form from the preceding, and which I only found in deposit *D*. As I have already said, it is hopeless to attempt to identify these species without figures. There can be little doubt this is one of the many new species of this group described by M. Bourguignat, *loc. cit.*, from the department.

CLAUSILIA (subgenus ?) PAULUCCIANA, n. sp. (Plate XIV. fig. 1.)

*Testa parva, rimata, fusiformis, tenuiuscula, cornea, haud nitens, regulariter ac eleganter costulata, costulis distantibus, subrectis; apex obtusiusculus, turgidus et quasi mamillatus; anfractus 10, supremi 3 convexi, lævigati, tumidi et mamillati, 3 sequentes contracti, plus minusve convexi, sensim crescentes, 4 ultimi subtumidi, convexi, fere æquales, ultimus subglobulosus, oblique rugoso-costulatus, basi acute ac distanter cristatus; apertura subpyriformis, haud eversa, lamella parietali superiore subrecta, plica spirali inconspicua; lamella parietalis inferior valde ascendens, remota, postice subbifurcata; plica subcolumellaris immersa, inconspicua; plica palatalis unica, supera, sat conspicua; perist. sensim solutum, continuum, expansiusculum ac reflexiusculum.*

Long.  $8\frac{1}{2}$ –9, diam. 2; apert. long.  $1\frac{1}{2}$  millim.

This charming little species appears to have been very rare. However we managed to procure about thirty specimens after much searching. It only occurs in deposits *B* and *C*. It is one of the most distinct and curious of all the Western-European forms. It varies a trifle in the greater or less convexity of the whorls; otherwise it appears to be wonderfully constant, especially as regards the three peculiar apical whorls, the general sculpture, and the aperture. The apical whorl is small and subobtuse, the next two swollen, tumid, and submamillate, all three being perfectly smooth; the next two are smaller (more contracted), regular, scarcely convex, and of almost equal size; the other five whorls are more or less rapidly swollen, the last three being of approximately equal height. The last whorl is more or less subglobose (varying somewhat); the sculpture is fairly constant, the last seven whorls being beautifully and distinctly costellated with nearly perpendicular, distant, subacute ribs; these on the last whorl, however, become more oblique, and near the peristome are very acute ("cristate" as it were). The aperture is detached from the last whorl in a very characteristic manner, though not everted; it becomes in old specimens subcallose.

Type, Indian Museum, Calcutta; also in coll. J. R. Bourguignat, Coombe Williams, P. Joly, T. Fagot, and Colonel Godwin-Austen.

STENOGYRA (RUMINA) DECOLLATA, Linnæus.

Abundant everywhere in the subaritime zone. A perfectly similar form also occurred by thousands in the upper stratum of Cape Mortela. I do not believe this mollusk existed at Menton at the time of deposits *A* to *F*; but I found a large stout variety always immediately associated with *H. paretiana* at Monaco, Cape Vieille, lower stratum at Cape Mortela, &c. At this last locality it was very interesting to notice how sharply the upper and lower strata were defined by the very marked difference in this species. The stout big variety from the lower stratum reminded me strongly of specimens I found near Bône, in Algeria.

Long. 33, diam.  $11\frac{1}{2}$  millim. Upper stratum, Cape Mortela, like the existing form.

FERUSSACIA GRONOVIANA, Risso<sup>1</sup> (as figured by Bourg., diam.  $3\frac{1}{4}$  millim.) (Plate XIV. fig. 2.)

An abundant species here and there in the subaritime zone only. I also found it in great numbers at Alassio. Taking a handful of living specimens from under one stone, the great variability in the shape of the whorls, production of the spire, &c. is at once seen; still the aperture and last whorl in especial always present certain characters by which the species can be recognized. The animal has the head, top of neck, and both sets of tentacles, also extreme posterior extremity dark green, almost black; the rest is a very bright greenish yellow.

Long. 10, diam.  $3\frac{3}{4}$ ; another—long. 9, diam.  $3\frac{3}{4}$  millim.

Var. SUBAMBLYA.

? *Ferussacia amblya*, Bourg. Mal. Alg. (long.  $8\frac{1}{2}$ , diam. 4 millim. Algiers).

This is a short convex form, with the last whorl a good deal more rounded, the aperture less everted, with the columella straight. The whorls increase very slowly and regularly, the difference of the antepenultimate one in this respect, from that of the typical form, being very marked. It may prove a distinct species; but I am inclined to doubt it at present. I only found a few specimens living with typical form.

Long.  $8\frac{1}{4}$ , alt.  $3\frac{1}{3}$  millim.

<sup>1</sup> [Among the examples of this species given me by Mr. G. Nevill I found a good many were still living; these I closely examined. The animal possesses a well-developed mucus-pore at the extremity of the foot, and therefore belongs to the Stenogyridæ of Crosse and Fischer. It is closely allied in its anatomy to the Madeiran form (*Lovea tornatellina*) described by the Rev. R. B. Watson in the P. Z. S. 1875, p. 677, which is of interest as regards geographical distribution. I hope soon to give some details of its anatomy, which I have prepared.—H. H. G.-A.]

## Var. SUBFOLLICULUS.

? *Ferussacia folliculus*, Gronovius (as figured by Bourg. Mal. Château d'If, pl. ii. fig. 2; long. 9, diam. 3 millim.).

A few specimens only met with living with typical *F. gronoviana*; they agree well with the above-quoted figure. The body-whorl is more elegantly and evenly rounded, not tumid towards the base, and appears longer in proportion than in the typical form.

Long. 9, diam.  $3\frac{1}{2}$  millim.; apert. alt.  $3\frac{3}{4}$  millim.

## Var. SUBFORBESI.

? *Ferussacia forbesi*, Bourg. Mal. Alg. (long.  $8\frac{1}{2}$ , diam. 4 millim. Algiers).

I doubt this variety, in especial, being specifically distinct. The whorls of the spire are only slightly irregular; the last whorl more convex, columella straighter. There is also a smaller form, of which I found only two specimens (of which I also give measurements below), which might be separated again as distinct. The aperture is very small.

Long.  $8\frac{1}{4}$ , diam.  $3\frac{1}{4}$  millim., et long.  $8\frac{1}{2}$ , diam.  $3\frac{1}{2}$  millim.

Long.  $7\frac{3}{4}$ , diam. 3 millim. (A small form, perhaps distinct).

All the preceding in Indian Museum, Calcutta. M. Bourguignat informs me by letter that I sent him, from Menton, specimens of *Ferussacia vescoi*, *amblya*, *procchia*, *forbesi*, and *abromea*. He does not mention *F. gronoviana*.

## FERUSSACIA (?) ABNORMIS, n. sp. (Plate XIV. fig. 3.)

*T. parva*, *subpyriformis*, *lavigata*, *nitidissima*, *vitrea et hyalina*; *apice obtusiusculo*; *anfract. 4* (aut  $4\frac{1}{2}$ ), *regulariter crescentes*, *primi 3 parvi*, *ultimus supra pertumidus*, *infra subtundatus*; *apertura magna*, *marginibus externo haud incrassato*, *regulariter paululum convexo*; *columellari haud calloso*, *valde intorta*.

At Blida, in Algeria, under a large stone in company with a species of *Ferussacia* (the latter with bright-greenish-yellow-coloured animal), I found a single specimen of what I took to be the young of a hyaline variety. It struck me at the time that it was of a more tumid shape than ordinary young specimens. Unfortunately I have not this shell available for examination at the present time. At Menton I was much astonished at finding among a lot of *F. gronoviana* (which also possesses a greenish-yellow animal) another, as I thought, young hyaline specimen, also of more tumid form. Unfortunately I took no especial note of the animal, except that it was of a pure hyaline white. On examination of the shell, after death of the animal, I was astonished to find the twisted fold of the columella of a totally distinct nature from that of *F. gronoviana* and its varieties in all stages, so much so that I am inclined to believe that anatomical examination will compel the separation of this species from the true *Ferussaciae*. The margins of the aperture not being thickened leaves it a matter of doubt whether the shell is full-grown. I am strongly of that opinion myself, but acknowledge it